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*Illustrated.

Brown's discipline, three-fourths full strength, has now been in force on the Buffalo, Rochester & Pittsburgh for two years, and with marked satisfaction to all concerned.

Deferred Suspensions on the B. R. & P.

This arrangement (described on another page) is quite similar to that which has been in effect on the New York Central (east of Buffalo) for about the same length of time; and the New York Central officers seem to be equally well satisfied. Some, no doubt, will be of the opinion that leaving the fear of actual suspension hanging over a man's head for a few months is an improvement on the plan of universal abolition of suspensions; and that instead of calling this scheme 75 per cent pure, we ought to rate it at 125, or some higher percentage. Railroad superintendents have the habit of judging largely by results; and pretty good results (as well as pretty bad) have been found under all plans—suspensions, deferred suspensions and no suspensions. Pure theory, however, still deserves consideration. The theorist has no responsibility, and therefore can set his standard very high; but can the railroad superintendent afford to do any less? The theorist, in this matter says, simply, "My conductors, enginemen, brakemen and firemen must be men of good enough quality to be at all times amenable to reason." That is all. If a man can be reasoned with he need not be suspended. The B. R. & P. rule ought to have a constant educational effect on all classes, and we shall look for further progress in the future. Meanwhile the Burlington and the Baltimore & Ohio, whose thoroughgoing abandonment of suspensions was the subject of articles in this paper last year (January 16 and June 12) report continued satisfaction with their practice.

One of the most frequent criticisms of state railway regulation is that the membership of state railway commissions is seldom,

A Railroad Man as State Commissioner

if ever, allowed to include practical railway men of any extended experience. Therefore, the appointment to the Wisconsin Railroad Commission of a railroad officer in active service, Walter Alexander, district master mechanic of the Chicago, Milwaukee & St. Paul, is interesting and significant, especially in view of the importance of the Wisconsin commission. The new governor of Wisconsin, E. L. Philipp, was formerly a railroad man himself, and more recently, as president of the Union Refrigerator Transit Company, has been in a position to understand some of the problems involved in railway operation and regulation. It is, therefore, quite natural that he should have taken advantage of the opportunity presented to him to fill a vacancy on the commission by an appointment well calculated to strengthen a body that has for several years commanded the respect of railroad officers. And he has apparently been fortunate in his selection. It is difficult to get the right kind of a railroad man to leave a good position to accept an appointment to an office, the tenure of which is likely to be limited, and the mere fact that an appointee has had practical experience in the business he is to regulate is likely to create a prejudice against him in political circles. There was some opposition among the members of the legislature to Mr. Alexander, simply because he was a railroad man, and his appointment was confirmed by the senate last week by a vote of only 17 to 15. Mr. Alexander has not only had an extended practical experience in an important department of his railroad, having had jurisdiction over the motive power east of the Mississippi river, but he is a self-made man. He began his railway work after a common school education, prepared himself for college while working as machinist, draftsman and fireman, and after receiving a thorough technical education, spent five years as an instructor in engineering at the University of Wisconsin, Armour Institute and the University of Missouri before returning to railroad service as an officer. The spirit which prompts the appointment of such a man to a railroad commission is highly gratifying.

The New York Public Service Commission, Second district, division of capitalization, which is in charge of Howard C. Hopson, has passed on 787 applications since it was created in 1907. The division in the commission's annual report quite properly points with some pride to the success of its efforts to pass promptly on applications for approval of security issues, calling attention to the fact that whereas there were 73 applications pending at the beginning of 1914, there were but 24 at the end of the year. This question of promptness is a very important one in connection with the discussion which is now going on of giving the Interstate Commerce Commission power to pass on the issuance of securities by all interstate railroad companies. There is also another point of general interest touched on in the New York commission's report for 1914. The report says:

The commission has found it to be for the best interests of all concerned to permit corporations with generating stations of large capacity which operate at a low cost to acquire small plants in their territory, especially when approved by local authorities. This results, in some cases, in the immediate retirement and abandonment of a considerable portion of the physical property involved.

Although this statement is made in regard to one particular form of public service corporation, it brings out quite clearly the conversion of one state public service commission to the principle which has so strongly been contended for by railroad and other public service companies and has so often been bitterly opposed by public sentiment and state commissions, namely, that the buying out of small competitors by a large monopoly may be an economic gain.

FALSIFICATION BY MISQUOTATION

THE representatives of the engineers and firemen in the western territory, in their testimony before the board of arbitration, have made a remarkable attempt to misrepresent the facts regarding the work done by these employees. They have introduced an exhibit entitled, "Evolution of Increased Power and Tonnage," which consists of quotations from statements of railway officers, railway newspapers and advertisements of railway equipment concerns purporting to show, as the title suggests, how, in the past few years, locomotives have increased in size and power, and how the train tonnage has increased, and having the underlying purpose of leading the board to believe that the labors of both the engineers and firemen have been correspondingly increased. This underlying purpose was sought to be accomplished by omitting from the quotations correlated phrases and sentences, the inclusion of which would have left an entirely different impression on the minds of the arbitrators.

The Conference Committee of Managers, representing the railroads, has countered by presenting an exhibit in which many of the quotations given by the engineers and firemen are printed in black and the qualifying statements which they omitted are printed in red. A few examples will illustrate the bald way in which the representatives of the engineers and firemen have tried to mislead the board.

In speaking of the conversion of simple locomotives into Mallet compounds on the Chicago Great Western, as described in the *Railway Age Gazette* of November 4, 1910, this paper said: "The maximum tractive effort of the engine was thus increased from 33,000 lb. to 52,000 lb., or 57.5 per cent." The representatives of the employees quoted the foregoing, but omitted the following, which appeared in the same article: "*The steam generating portion of the old locomotive remains the same. . . . It is claimed that converted Mallets on other roads are hauling 50 per cent greater tonnage with the same amount of coal consumed by the old locomotives.*"

W. L. Park, vice-president of the Illinois Central, was quoted as having said in 1910 that the locomotive engineer was hauling 100 per cent more tonnage than he did 10 years before; but the following statements made by Mr. Park at the same time were

omitted: "*The people have received the benefit of this, for, notwithstanding the increase in wages amounting to from 25 to 50 per cent, increased cost of supplies and material, and the entire cost of the railroads' living, they have maintained the cost of transportation to the public at the lowest rates in the world, 7.5 mills per ton per mile.*"

The *Railway Age Gazette*, in its issue of March 28, 1913, referring to the locomotives built by the Baldwin works in 1912, said: "Under favorable conditions, such locomotives"—Mikados—"equipped with superheaters, are hauling 30 per cent more tonnage than the saturated steam Consolidation type engines formerly used in the same service *with no increase in actual coal consumption.*" The labor people quoted the first part of this sentence, but carefully suppressed the part of it which we give in italics. Further on in the same article we said: "A notable order for Mallet locomotives was filled for the Great Northern, which received 25 engines of the 2-8-8-0 type. These exert a tractive effort of 100,000 lb. *working compound, and are fitted with Emerson superheaters.*" In a sentence further on it was stated that—"Seventeen of these locomotives are coal burners, while the remaining eight use oil for fuel." The words here italicized were carefully left out of the employees' exhibit.

In an article describing the Mikado locomotives for the Lake Shore, published in the *Railway Age Gazette* for May 2, 1913, it was stated that although the tractive effort of these engines was only 22½ per cent greater than that of the Consolidations which they replaced, they handle 35 per cent greater tonnage. The exhibit of the brotherhoods quoted the foregoing statement, but omitted the following: "*The average for three trips of a superheater Consolidation locomotive. . . . showed that it burned 15.9 tons of coal per trip of about 130 miles when hauling a 60-car train of 2,335 tons. . . . The average of three trips over the same division with a Mikado was 12.85 tons of coal when hauling a train that averaged 70 cars of 3,203 tons.*"

Under the heading of "Labors of Engineers and Firemen Have Increased with Increased Power and Tonnage" in the brotherhoods' exhibit the following quotation is made from the *Railway Age Gazette* of November 11, 1910, page 911: "The operation of a Mallet engine involves somewhat more work and responsibility for the engineer than the operation of a smaller engine." The railroads, in their exhibit, finished the sentence as follows: "*and for this reason the railway managers concede that engineers on them should be paid more,*" and added the following, which appeared in the same article: "*They, therefore, offered them a differential of 75 cents a day; but the officers of the Brotherhood insisted that engineers on Mallets be paid practically double what others received. . . . The adoption of the principle that engineers running Mallets shall receive anything like twice as much as engineers on other engines would very seriously interfere with the economies for which these engines have been invented and introduced.*"

Again, the representatives of the employees quoted from an editorial in the *Railway Age Gazette* of April 26, 1912, page 944, as follows: "Firemen have been known to shovel between 6,000 and 7,000 lb. per hour, but they worked under such a pressure that they could not be expected to secure the most efficient results." The sentence immediately following, which they omitted, read thus: "*Realizing the necessity of . . . keeping within the limitations of the average fireman, the locomotive designers have introduced a number of important features during recent years which have gradually increased the capacity of the locomotive without making additional demands upon the engineman or the fireman.*"

The above are but a very small number of the quotations successfully challenged by the railroads, but they are typical, and show quite clearly the methods adopted by the brotherhoods in preparing this exhibit. They are a fine example of falsification by misquotation. A cause which is supported by such methods must be very unfortunate either in its intrinsic merits or in its spokesmen.

FEDERAL BOILER INSPECTORS SEEK ENTIRE CONTROL OF LOCOMOTIVES

THE potential evils in the amendment to the Federal Locomotive Boiler Inspection Act, which has already passed the House and is now under consideration in the Senate, giving the Bureau of Locomotive Boiler Inspection the same jurisdiction over the entire locomotive and tender as it now has over the locomotive boiler, are so numerous and of such a character that determined action should be taken to prevent it from becoming a law. As it now stands it gives the federal boiler inspectors absolute authority to decide whether or not in *their* opinion a locomotive is safe to operate in the service to which it is put. We quote below Section II of the amendment:

Section II. That the chief inspector and the two assistant chief inspectors, together with all the district inspectors, appointed under the Act of February 17, 1911, shall inspect and shall have the same powers and duties with respect to all the parts and appurtenances of the locomotive and tender that they now have with respect to the boiler of a locomotive and the appurtenances thereof, and the said Act of February 17, 1911, shall apply to and include the entire locomotive and tender and all their parts with the same force and effect as it now applies to locomotive boilers and their appurtenances. That upon the passage of this Act all inspectors and applicants for the position of inspector shall be examined touching their qualifications and fitness with respect to the additional duties imposed by this Act.

The framers of the amendment evidently assume that a \$1,800 a year boiler maker is competent to determine at a glance whether locomotive wheel tires are too badly worn, whether a spring has too great a deflection, whether there is too much lateral play in the wheels, whether the side bearings of trucks are correctly located and their clearance sufficient, and so on. In other words, it is assumed that these \$1,800 inspectors are all around mechanical experts, or that men could be procured at that salary who are so familiar with *all* of the conditions on *all* of the railroads in their district, and who have such a knowledge of *all* of the different designs of locomotives and tenders, in addition to possessing the concrete knowledge of boilers necessary under the present law that they can competently determine when a locomotive is safe to operate in the service in which it is placed.

It thus becomes strikingly apparent to what grave injustice the railways will be subjected by this amendment, unintentionally perhaps, but none the less disastrously to satisfactory railway operation. What a weapon this amendment would place in the hands of those behind this proposed act—organized labor. Locomotives could be held out of service on the slightest pretext, and the operation of a railway materially crippled. If the people of this country, through their representatives in Congress, desire that locomotives and tenders be inspected by government inspectors the railways might be willing to submit to such inspection, but the public, in justice to the railways, and in its own interest, should not permit this unlimited authority to be placed in the hands of a body of men whose training does not qualify them to exercise it. If any such extension of the locomotive boiler inspection act is necessary, and it is to fulfill its purpose, elaborate standards must be adopted for the inspectors and the roads to follow, and in these standards allowance must be made for the varying conditions throughout the country. It is not a subject that can be passed on lightly. It deserves the most careful consideration by railway mechanical experts.

If it is necessary to inspect the locomotives and tenders at all the work should be done thoroughly, and it is far beyond the capabilities of the Bureau of Locomotive Boiler Inspection to handle it in this manner. A special department under the Interstate Commerce Commission would be necessary, officered by men familiar with all phases of locomotive design and construction. As the amendment now stands, the inspection required by it could not be adequately performed, it would be a source of constant controversy, and it would cause great injustice to the railroads, tying them hand and foot, and placing them at the mercy of a subordinate department of the Inter-

state Commerce Commission, and through it at the mercy of organized labor. It is hardly conceivable that the Senate will pass the proposed amendment in its present form.

FULL-CREW LAW ARGUMENTS

THE movement for the repeal of "full-crew" laws, more accurately called "extra-crew" laws, is in danger of being weakened because of its very strength. The arguments against repeal are so poor and thin that nobody states them; and persons who have not followed what has been published on the subject during the past two years are mystified by the presentation of an issue which seems to have only one side. The fair-minded citizen who is in the habit of deciding for himself looks habitually at both sides of every question; but here he finds that there isn't any adverse side.

Assuming, for the time being, the role of attorney for the defense, we will try to put the issue into a more presentable form. The real reasons why the extra-crew laws have been passed are only two, and very simple ones; the desire of the brotherhood leaders to make more jobs for brakemen, and the desire of legislators to please "labor," no matter what it may ask for. Back of these outward motives, the labor leader is seeking to intrench himself in his position as leader; and the legislator has a purpose equally selfish. But the movement for legislation has had a tiny thread of respectability. These selfish interests—aiming, of course, to conceal their selfishness—have claimed that a long freight train was more dangerous than a short one, and that, therefore, more trainmen were needed to guard against the dangers. This claim was not asserted very loudly, because the danger was admittedly rather small. Moreover, there was no need of loud proclamation; the legislative committee man can hear a whisper, if it comes from one whom he believes to be backed by a majority of the voters.

There is, then, theoretically, a useful function on a long train for a third brakeman; on a train, say of 80 cars, extending back more than half a mile from the engine. If the rear-end man goes back with a flag, and if, while he is gone, it is necessary to do some switching, the conductor will wish that he had another man; he cannot set out a car, or take on a car, and make the necessary exchange of bills with the station agent, quite so quickly as he could if he had both his assistants with him. This consideration may lead crews to neglect flagging, and so introduce a theoretical danger. Another element of danger on a long train is the possibility that a wheel or an axle may fail under a car in the middle of the train, or a brake-beam fall on the track, and the danger not be promptly discovered because the trainmen are so far away from it. The philanthropic legislator, stern in his devotion to the safety of the public, quickly votes to employ an additional man to ride on the middle of the train to guard against this risk. The legislator is oblivious to the fact that the insurance companies—if statistics could be gathered—would be glad to insure against this danger for, probably, a hundredth or a five-hundredth part of the extra brakeman's wages.

The other reasons which have been set up in favor of these laws are equally thin—or thinner. In actual practice the occasions when time can be saved or convenience promoted, or dangers averted, by the third man, are so infrequent that the benefit which results cannot be measured.

There is no denying that a third man on a train—or a fourth, and a fifth—might, if possessing ideal intelligence, vigilance and faithfulness, occasionally do something to ward off some danger. So could a third man in the locomotive, acting as second assistant lookout man. This extra lookout has been advocated many times, and the idea has even been favored by some railroad men; but only a little calm reflection is needed to show that, admitting a trace of reason in the idea, the money spent to carry it out would do a thousand times more good if spent in other directions. Another notion of the same sort is that an important function of the train despatcher is to watch the train-

sheet so closely that he will discover when some one of a hundred enginemen is on the point of disobeying an order, and send a message to head him off. Train despatchers have, indeed, prevented collisions by acts of the kind suggested; but to call this other than an incidental function is to reverse the natural order.

It is the same in the case of the lookout man and the extra brakeman. The railroads are wrong when they declare so persistently that the \$1,600,000 spent in Pennsylvania each year for extra brakemen is wholly wasted. Looking at the matter in the narrowest possible way, the extra service may be worth a fraction of the sum spent; say \$16, or \$160, or even \$1,600. But no concern engaged in serving the public and deriving its income from the public has any right to spend its money in such an extravagant way. And beyond this narrow and short-sighted consideration of the question, it is to be remembered that an extra brakeman may do positive harm. Unless he is a very exceptional man he is likely to impair discipline, and to depress the morale of the force in other ways. Idle men need watching. And he may get hurt in getting on or off the cars, or in other ways, causing expense to the company or himself.

THE DECISION IN THE TRANSCONTINENTAL FOURTH SECTION CASE

THE Interstate Commerce Commission in its latest decision in the transcontinental fourth section rate cases, has shown a disposition to co-operate with the railroads in solving one of their most difficult problems. Although the decision does not grant the roads the full measure of relief that they asked for from a hard and fast application of the fourth section rule, the commission has shown a willingness to recognize the changes in conditions since the issuance of its previous order in the case in 1911. In the new order it has departed considerably from the rule it laid down at that time. The rule then laid down made the rates to the intermountain points dependent on the rates to the coast terminals. The order embodying this rule, it will be remembered, was held up by litigation for nearly three years, and when it was finally sustained by the Supreme Court the Panama Canal was about to be opened for traffic, thus bringing about a new set of conditions.

The roads have already put into effect rates conforming to the requirements of the original order except on the list of about 100 commodities involved in the latest order and concerning which the roads asked relief which would enable them to meet the low rates via the Panama Canal without disturbing their intermediate rates. These commodities include the bulk of the traffic on which the water competition would be most keenly felt and at the hearing before the commission in October the roads were able to show definitely what low rates they would have to make to participate in the competitive business. Since the hearing the roads have withdrawn 27 of the commodities from the list on which they asked relief and as to some of the rest the commission has granted something less than the full relief requested, and imposed certain requirements as to the maxima to be observed at the intermediate points. Since the hearing, however, another change in conditions has occurred of which the commission has not taken cognizance in its decision which will be of benefit to the roads for a time.

The high ocean freight rates caused by the war have attracted away many of the boats that were competing actively with the railroads for the Pacific coast traffic via the Canal and the slides in the canal have made it impossible for some of the other boats to carry their full tonnage, so that there is now a large accumulation of freight on the Atlantic seaboard for the Pacific coast which the railways are likely to get.

The Interstate Commerce Commission is not in sympathy with the ideas of many people who have considered the construction of the canal as indicative of a governmental policy to divert as much of the coast-to-coast business as possible to the water lines. "This suggestion," it says, "loses force under the consideration that the Panama Canal is but one of the agencies of transporta-

tion that the government of the United States has fostered between the Atlantic coast and the Pacific. . . . Some of these transcontinental lines would not have been built had it not been for the liberality the government extended to them at the time of their construction. As we view it the Panama Canal is to be one of the agencies of transportation between the East and the West, but not necessarily the sole carrier of coast-to-coast business." With this idea in mind the commission may be expected to meet changed conditions as they arise in the way that the situation requires.

EASTERN RAILWAYS APPEAL TO THE PUBLIC

THE statement which the eastern railways have issued to the public in opening their campaign for the repeal of the train crew laws in Pennsylvania and New Jersey is a remarkable document. It is remarkable because of the overwhelming conclusiveness of its argument against such legislation. It is more remarkable, however, as a kind of confession of faith by the railway presidents who issued it. They admit that in the past railroads have been too slow in introducing safety devices "largely because of a stupid and stubborn attitude of mind once too prevalent among railway managers." They agree that "far too many are killed or injured on the railroads" and that "property rights fall secondary to human rights." They refer to the fact that "railroad officers are merely salaried men" and concede that "their duties and responsibilities are those of stewards." Having thus condemned the attitude which formerly prevailed among railway managers and stated the attitude assumed by them now, they contend that their attack upon the full crew laws is entirely consistent with their relation of stewardship to the public, and, in fact, grows out of it. The train crew laws, they contend, cause economic waste by giving employment to men who have nothing to do and reduce rather than increase the safety of operation. They are, therefore, unmitigatedly harmful to the public; and it is in the performance of their stewardship to the public that railway officers appeal to it to cause the repeal of these laws.

One of the notable statements in the document is, "It is frankly recognized that railroad employees have a right to organize," and "we believe it to be as impossible for the individual employee in a great transportation system to be certain of fair treatment acting by himself as we know it would be impossible for one man to provide the capital necessary for creation of the huge Pennsylvania Railroad System." The tone and candor of this expression from the eastern railway presidents has provoked some manifestations of astonishment from certain newspapers. But there is nothing in it to cause surprise in it. The change in the attitude of railway executives has been well known for some years to those who have been in close touch with the railway business. When railway presidents go before the public in such a statement the public is pretty certain sooner or later to respond in kind. If the roads continue to take their case to the public as they are doing now it will not be long until there will be a great change in railway regulation and until agitation against railways will become a liability instead of an asset to the politician.

NEW BOOKS

Railway Fire Protection Proceedings. Published by the Railway Fire Protection Association, C. B. Edwards, fire insurance agent, Mobile and Ohio, Mobile, Ala., secretary. 167 pages. Bound in paper.

These proceedings are for the second annual meeting of the Railway Fire Protection Association, held at Washington, D. C., October 6 and 7, 1914. The several papers presented were published in some detail in the *Railway Age Gazette* of November 20, 1914, page 943. They included reports on Fire Hazards, Statistics and Forms, Fire Fighting Organization and Fire Fighting Apparatus. The report of the committee on Fire Hazards, Charles N. Rambo (Norfolk & Western) chairman, was especially important, and with the discussion covers 76 pages. The several committee reports contained excellent recommendations.

Is the Railroad Y. M. C. A. Really Worth While?

PART I—Reasons Why This Organization Gives Better Results Than What Is Known as the Club House Plan

The Railroad Y. M. C. A. has not been spectacular in its development or in the accomplishment of its work. Steadily, but gradually and quietly, it has been extending its operations and perfecting its methods for many years—since 1871. It has had the backing of many farsighted railway executives and has received financial assistance from many roads; but the very nature of its work—providing clean, comfortable and uplifting surroundings for the trainmen and enginemen who lay over at terminals at the opposite ends of the runs from their homes—and the fact that the quarters are frequently far removed from the business and social centers of the communities in which they are located, has kept it from attracting the general attention which its importance deserves.

In late years much has been printed in popular magazines concerning reading rooms and social clubs which have been established by some of the railroads. The writers have embellished these descriptions with striking and human interest incidents, with fine figures of speech, and sometimes it would seem with rhetorical flights of imagination. Most of them, however, seem almost entirely to have overlooked the less spectacular but larger and more thoroughly established work of the Railroad Y. M. C. A. Why? Has the latter institution been remiss in its work, and has it failed in the accomplishment of the high ideals for which it stands? Has the "C" in the Y. M. C. A., standing for all it does in character building and broad brotherly sympathy, given offense or narrowed the field of its work? Have the railways which have helped to support the institution been giving their money for something which has produced intangible results? In a word, is the whole movement really worth while?

With this in mind, it was decided to investigate the work more or less thoroughly on three of the eastern railroads which were selected for the following reasons: Each one, small in physical size as compared with some of the larger systems, is known because of its progressive and, to a certain extent also, aggressive attitude. All three have had much experience with the Railroad Y. M. C. A. and believe in it. On each, however, this work is administered and supervised differently so far as details are concerned. Operating in different territories and under varied conditions, physical and otherwise, and particularly as concerns the religious beliefs of the greater part of the employees, it was thought possible to obtain a good idea of the adaptability of the institution to varying conditions. Practically one week was devoted to visiting and studying the fourteen Railroad Y. M. C. A. institutions on these three roads, the visits varying in length, depending largely on the importance of the location, and being made at all times of day and night. In the greater number of cases the railroad officers on the division, foremen and many of the employees were interviewed. In some cases the local boards having in charge the direction of the work, together with such railway officers and foremen as were available, gathered for luncheon or dinner conferences. The editor who made the study conducted the interviews in the attitude of "the man from Missouri" and critically inspected the different buildings from top to bottom, special attention being given to sleeping rooms, kitchens, storerooms and out of the way corners, including that part of the property directly back of the kitchen, and also to the attitude of the men in and about the buildings. Almost a year has elapsed since this trip was made; meanwhile the work has been looked into more or less incidentally in connection with trips over several other railroads, and several days were spent during August at the Railroad Y. M. C. A. summer school at Silver Bay, N. Y.

THE ORGANIZATION

In the first place it should be understood that the Railroad

Association work at each point is in direct charge of a trained secretary who works with both the railroad and the general Railroad Association organizations. Associated with him is a board of managers usually made up of local railroad officers and employees. The railroad department of the International Y. M. C. A. is directed by a railroad committee of seven members, with Dr. John P. Munn, of New York, as chairman. The other members are B. D. Caldwell, president of Wells, Fargo & Company Express; W. E. S. Griswold; William A. Patton, assistant to the president of the Pennsylvania Railroad; Abner Kingman; John Carstensen, vice-president of the New York Central, and A. M. Schoyer, vice-president of the Pennsylvania Lines.

The work is directly supervised by the international and the several state committees. John F. Moore is the general railroad secretary of the former, and is assisted by several traveling secretaries, each of whom covers a particular section of the country. For instance, J. M. Dudley is located at Montreal and looks after the Canadian associations; E. L. Hamilton has general charge of the associations on the New York Central Lines, the Delaware, Lackawanna & Western and the Buffalo, Rochester & Pittsburgh; A. G. Knebel, with headquarters at St. Louis, looks after the Gould lines and the Southwest; A. B. Minear, with headquarters at Chicago, has jurisdiction over the central and northwestern associations; H. O. Williams, with headquarters at New York, looks after the New England and southeastern associations, and G. K. Roper, Jr., whose headquarters are at Richmond, looks after the southern district.

There are also connected with the general department several specialists, each of whom is retained in an advisory capacity for some special branch of the work. D. S. Hanchett looks after educational work and co-operates with Mr. Moore in the publication of the Railroad Association Magazine; W. H. Ball, in charge of physical development, also gives attention to sanitation, ventilation, dormitory equipment, games and building arrangement; W. A. Cochran is in charge of installing a uniform system of accounting; A. W. MacNeil is the restaurant expert and during the summer months is in charge of the summer school hotel at Silver Bay, N. Y.; M. S. Safford is in charge of the development of membership campaigns; H. F. Reinhardt is emergency specialist, and W. G. Mason looks after evangelistic work. The traveling secretaries keep in close touch with the local secretaries and with the needs of the work and supervise it in a general way in more or less detail.

In approaching the local railroad officials at the various points in connection with the investigation, two questions were invariably put to them, not always in the same way and never in the early part of the conference, but always amounting in effect to the following: Is the Railroad Y. M. C. A. really worth while, and what is it accomplishing in a practical way? If it is capable of performing an important work in the interests of the railroads, why not have this work done by the railroads themselves? More directly, this second question might be stated in this way: Why cannot the railroads handle the work to better advantage without assistance from an outside organization? The purpose of this article is to answer these two questions. The last one will be considered first because in large part it will explain the reason for the answer which will be given to the first one.

BIG LEADERS REQUIRED

The amount of equipment which may be necessary and the work accomplished by the Railroad Y. M. C. A. depends on the size, nature and location of the terminal, and on its relation to the other points on the system and to the operation of the road as a whole. For instance, at some points it may be neces-

sary to provide a large number of sleeping accommodations both day and night and to serve meals at all hours. At other places it may not be necessary to provide any meals, and only a few sleeping rooms may be required. At some terminals conditions may be such as to make it necessary to place special stress on the educational work or on the recreation features. In all cases it is necessary to maintain a reading room, to carry on some educational work, to maintain Bible classes, attendance on which is entirely optional, and to keep in close personal touch with the men in order to help them to lead clean, upright lives so that they will be in such physical and mental condition at all times as properly to perform their duties and be a credit to the service.

What sort of man is required to act as the director and leader of this work? Is it easy to find a good Railroad Y. M. C. A. secretary? Let us examine the requirements. In the first place he must be something of a financier, for good meals and clean and comfortable sleeping quarters must be provided at a comparatively small cost. While the men pay a nominal price for this service, and the railroads help out with a large or small appropriation, as the case may be, it is only by the most careful planning that the secretary can make ends meet. He must be more or less of a promoter in order to extend and build up the work and make its influence felt to as great a degree as possible. He must be something of a teacher, for even if he does not personally have to take charge of the educational classes, he must be able to secure and direct those who can do so to the best advantage. He must be a religious leader, and in a broad way, for necessarily the men who make use of the buildings are of different or no religious beliefs and this work must be carried on diplomatically in order not to give offense. The necessity of this qualification will appear throughout this article, and particularly in the second part. More than anything else, he must be a good executive or administrator in order to keep the various parts of the work well balanced and to carry it forward in an effective and progressive manner.

Manifestly there is no department in a railroad for the development and training of these men. There is no officer who has the time or training to select such men and encourage them to take up the work, even if the facilities were at hand to train them. On the other hand, the Y. M. C. A. has a splendid opportunity of locating and bringing out men of this type because of its intimate contact with the best type of Christian youth throughout the country. In addition to this it has two special schools or colleges, one at Chicago, and one at Springfield, Mass., especially devised for the training of secretaries and workers. These schools offer a three-year course, a high school education being required for entrance. Several summer schools are carried on each year in various parts of the country for the continued training and inspiration of those men who have taken places as secretaries or assistant secretaries, or are looking forward to training themselves for these positions. Moreover, because of the large number of railroad associations—251 to be exact—some of them quite large and requiring a force of assistant secretaries, it is possible to try men out and gradually to develop them by first using them as assistants at some important point.

Men who possess the above mentioned requirements and who enter this work, manifestly do not go into it primarily for the financial returns, for secretaryships do not pay as much as men of this type could earn in other fields. Generally speaking, it would appear that the men who become trained secretaries are attracted to the work in much the same way as teachers or religious leaders because of the opportunity of being of service and helping their fellow men. It speaks well for this day and age that so large a proportion of our young men are accepting these calls for service. The success of the work at any one point depends on the personality of the secretary and the degree to which he is able to fill the requirements outlined above. Benjamin McKeen, general manager of the Pennsylvania Lines, has tersely expressed this thought in the following words:

"Knowledge of its work impresses one with the character and ability of those directly in charge. To their singleness of purpose and personal sacrifice may be attributed its continuing success." In this same connection Frank Trumbull, chairman of the board of directors of the Chesapeake & Ohio, has expressed himself as follows: "These associations are doing most effective work, and the thing that distinguishes this movement, in my opinion, from the ordinary club house work is that it is well organized. In the second place, the secretaries are men of sacrificial devotion to their work, a thing we cannot buy with money if we go away from the methods of the Y. M. C. A. and put such work simply on a secular basis."

Because the railroads are not in a position to secure, develop and train these men and to supply the means of continued training and inspiration after they have entered the work, it is necessary to depend on the Railroad Y. M. C. A. which is so well fitted to perform this duty. In addition, the general organization of the Railroad Association, with years of experience and a thorough knowledge of the work in all its details, is especially fitted to supervise and direct the work in a broad way, although it should be emphatically understood that the railroads must do their part in backing up and checking the work and in seeing that it is carried on efficiently and economically.

If one is at all skeptical as to whether the Railroad Y. M. C. A. is successful in finding and training the right kind of secretaries, a visit to a number of the institutions will dissipate the idea. If a secretary lacks somewhat in some of the qualifications, the traveling secretary is apt to discover the deficiency and focuses his attention upon it. Often it is possible to upbuild and develop men, thus overcoming their peculiar weaknesses, or it may be possible to supply an assistant to protect the weak point. If a mistake in judgment is made in placing a secretary, it does not take long to find it out and he is soon placed elsewhere, or if he is totally unfit is eliminated from the service.

As suggested by Mr. Trumbull, in the extract above quoted, another prime factor in the success of the Railroad Y. M. C. A. is in its organization. W. J. Cunningham, professor of transportation at Harvard University and president's assistant on the Boston & Maine, covered this point quite fully in an article on "Elements of Strength in the Railroad Association," which appeared in the first number of the Railroad Association Magazine, November 15, 1911. The following extract is taken from that article:

"The organization, in which the men themselves have a direct part, is designed to hold the interest of the membership. The board of management, on which every branch of the service may have representation, provides for local autonomy, and prevents the harmful effect of paternalistic government. A comparison of the typical railroad association with rest rooms managed directly by the railroad company will show a marked difference in club spirit, or *esprit de corps*. The former is governed by members (as members, not as employees of contributing companies) through their own board of managers or executive committee, and no member is permitted to forget that it is his association and that his membership fee or any other contribution he may make toward its support is not a tax but a participation in an enterprise of which he is a part. He understands also that the appropriations of the railroad companies are based on business principles; that it is not paternalism but an investment in a project which is known to be mutually advantageous. On the other hand, the company rest room can hardly be regarded in any other light than a company institution, and it would be unnatural for the men to take as much interest in it as in an association in which they are a vital part."

So much for the reasons why the railroads find it wise to go outside of their own organizations for assistance in carrying on this work. In the second part of this article, which will appear in an early issue, a more direct answer will be given to the question, "Is the Railroad Y. M. C. A. Really Worth While?" by showing the practical benefits which have followed its introduction on different roads.

Commodity Rates to the Pacific Coast Terminals

Railroads Granted Additional Fourth Section Relief as to Rates on Commodities Also Moving by Panama Canal

The following is an abstract of the decision of the Interstate Commerce Commission given in 32 I. C. C., 611, bearing the above title and dealing with applications for relief under the fourth section with respect to commodity rates from points of origin east of the Missouri river to Pacific coast terminals and intermediate points. The case deals with a large number of commodities which move to a large extent by water and upon which the present rail rates to the Pacific coast terminals are already quite low. The carriers by rail desire further to decrease these rates so that they may continue to compete for this traffic with the carriers by water now using the Panama Canal, and find that to do so they will need further relief from the requirements of the fourth section if they are not to suffer serious loss of revenue on shipments to intermediate points. In the abstract the language of the commission has been retained insofar as possible.

The commission in Fourth Section, Order 124, dated June 2, 1911, refused to permit the carriers to maintain lower commodity rates from points west of the Missouri river to the Pacific coast than to intermediate points, but authorized higher rates to intermediate points than to the coast on traffic originating in territory contiguous to Chicago (zone 1), other territory west of the Buffalo-Pittsburgh line (zone 3), and territory east of that line (zone 4), by 7, 15 and 25 per cent, respectively.

Appeal was taken to the Commerce Court from this decision, and on November 9, 1911, that court set aside the order. The United States Supreme Court, however, in the *Intermountain Rate Cases*, 234 U. S., 476, decided June 22, 1914, upheld the commission. Last July [as noted in the *Railway Age Gazette* of July 24, 1914], at the request of the carriers and to give them time to compile rates conforming with its order, the commission extended the effective date of that order from June 2, 1911, to October 1, 1914 [the order having been held in abeyance pending the court decision], except as to the rates on the commodities in schedule C, concerning which the order was extended to January 1, 1915. Upon the commodities in this schedule the rail carriers need additional relief to enable them to compete with the carriers by water.

Schedule C is a list of 107 commodities, covering generally manufactured articles subject to the most severe water competition and on which the rates to the coast are less than \$1 c. l. and \$2 l. c. l. The schedule embraces such articles as sulphate of ammonia, chloride of calcium, carbide of calcium, canned fruit, figs, corn, meat, mince-meat, tomatoes, etc.; green coffee, cotton piece goods, hardware and tools, pig iron, structural iron, iron fence, iron posts, iron wires, wire fencing, paint, paper, rice, radiators, sectional boilers, etc.; pig and flat tin and insulated copper wire. The entire list of the commodities named in the schedule, the rates now applicable and the proposed rates are shown in an appendix to the report.

The proposed rates to the north Pacific coast on these items are usually, but not invariably the same as to the California terminals. The railroads assert, with truth:

That the commodities included originate in large volume on the Atlantic seaboard.

That as a whole they are adapted to water transportation and in fact move in considerable quantity from the Atlantic seaboard to the Pacific coast by water.

That the rates by water on them are extremely low and necessitate correspondingly low rates by rail.

That the low rates so imposed from the eastern seaboard to the Pacific coast necessitate correspondingly low rates from the Buffalo, Detroit, Chicago, St. Louis and Missouri river territories (a) so as to permit rail movement from these points to

the Pacific coast in competition with the same or similar commodities moving from the Atlantic seaboard; (b) in order to comply with the fourth section—

That since the opening of the Panama Canal the water carriers have materially reduced their rates, shortened the time for transportation, increased the frequency of their sailings and materially added both to their tonnage capacity and to the actual tonnage obtained.

It may be remarked at the outset that the request for additional relief has been withdrawn with respect to 27 of the items which have been transferred to schedules A or B and on which rates are published in accordance with the original order.

It is evident that whatever may have been the degree of competition in the past between the rail and water carriers as to the rates on these articles concerning which additional relief is now sought, we are witnessing the beginning of a new era in transportation between the Atlantic and Pacific coasts. To secure any considerable percentage of this coast-to-coast traffic rates on many commodities must be established by the rail lines materially lower than those now existing.

It has been suggested that the construction of the Panama Canal by the government is indicative of a governmental policy to secure all of this coast-to-coast business for the water lines, and that no adjustment of rates by the rail lines should be permitted which will take away traffic from the ocean carriers which normally might be carried by them. This suggestion, however, loses force under the consideration that the Panama Canal is but one of the agencies of transportation that the government has fostered between the Atlantic and the Pacific. The government has from the beginning of railroad construction in the United States encouraged their construction and operation by private capital and enterprise. Some of these transcontinental lines would not have been built had it not been for the liberality the government extended to them at the time of their construction. As we view it, the Panama Canal is to be one of the agencies of transportation between the East and the West, but not necessarily the sole carrier of the coast-to-coast business. If the railroads are able to make such rates from the Atlantic seaboard to the Pacific coast as will hold to their lines some portion of this traffic with profit to themselves, they should be permitted so to do. The acceptance of this traffic will add something to their net revenues, and to that extent decrease, and not increase, the burden that must be borne by other traffic. It will also give the shippers at the coast points the benefits of an additional and a competitive service.

Few, if any, of the intervening interests are really opposing the petition of these carriers for relief. The intermountain territory, however, is earnestly protesting against the request of the carriers for relief as to the coast rates without adequate provision at the same time for reasonable rates to intermediate intermountain points.

The carriers should be permitted to compete for this long-distance traffic so long as it may be secured at rates which clearly cover the out-of-pocket cost. The lowest proposed rate from Atlantic seaboard territory is 65 cents per 100 lb. on cast and wrought iron pipe in carloads of 40,000 lb. This gives a per car earning of \$260, and upon a basis of a 3,200-mile haul yields a car-mile revenue of 8.1 cents and a ton-mile revenue of 4.05 mills. Since the average ton-mile revenue of these carriers is approximately 9 mills, it is probable that a rate which produces 45 per cent as much as the average pays more than the out-of-pocket cost and therefore does not impose a burden upon other traffic. None of the rates proposed appear, therefore, to be open to the charge that they pay less than the out-

of-pocket cost. Many of them are low as applied to the total haul from the Atlantic seaboard, but they are not for that reason low as applied to the haul from the Missouri river. The average haul from the Missouri river territory to the Pacific coast is approximately 1,850 miles. The rate of 65 cents on iron pipe in carloads of 40,000 lb. yields a revenue for this haul of 14 cents per car-mile and a ton-mile revenue of 7 mills. The lowest rate proposed from the Missouri river to the coast is 42 cents per 100 lb. on coal in carloads, carload minimum 60,000 lb. This rate, applied to a haul of 1,850 miles, yields a car-mile revenue of 13.6 cents and a ton-mile revenue of 4.5 mills.

Another relatively low rate from the Missouri river to the coast is that on pig iron, in carloads of 80,000 lb., of 45 cents per 100 lb. On a haul of 1,850 miles this affords a car-mile revenue of 19 cents and a ton-mile revenue of 4.85 mills. Examination of the list of commodities and the proposed rates shows one item, coal, on which a rate of 42 cents is in effect; one item, pig iron, on which a rate of 45 cents is proposed; 19 items on which a 55-cent rate is proposed; three items on which a 60-cent rate is proposed; six items on which a 65-cent rate is proposed; and one item on which a 70-cent rate is proposed. The most important of these items are those on which a rate of 55 cents is proposed. On 14 of these items the rate is based on a carload minimum of 80,000 lb., and of the other five items two are based on a carload minimum of 60,000 lb., one on a minimum of 50,000 lb., and two on a minimum of 40,000 lb. The 55-cent rate and 80,000 lb. minimum yield a loaded car-mile revenue of 23.7 cents and a ton-mile revenue of 5.9 mills for a haul of 1,850 miles, while the 40,000 lb. minimum yields a car-mile revenue of 11.8 cents and a ton-mile revenue of 5.9 mills.

The two main territories of destination involved are described as follows: (1) All that territory lying along these main trunk lines to which rates are made or will be made by combination on the coast terminals. This may be called the back-haul territory. (2) Territory lying east of that just described. The 55-cent rate and carload minimum of 80,000 lb. yield a higher car-mile revenue and a much lower ton-mile revenue than the average returns of any of these lines. Their average load per car varies from 16 tons on the Atchison, Topeka & Santa Fe to 23 tons on the Great Northern. These heavy cars of 80,000 lb. minimum carry at least double the average load on these systems. We are of the opinion that these 55-cent rates and other carload rates yielding a less revenue than 8 mills per ton-mile for the haul from the Missouri river to the Pacific coast may be considered as relatively low. This, however, should not apply to coal or pig iron. We believe that on these commodities the rate should not be considered unduly low for this haul unless yielding a revenue of less than 5 mills per ton-mile. A revenue of 8 mills per ton-mile for a haul of 1,850 miles corresponds with a rate of 75 cents per 100 lb.

No relief will be given as to rates from the Missouri river to the Pacific coast which are 75 cents or more per 100 lb. Upon commodities in this list, other than coal and pig iron, which move to the terminals on rates of less than 75 cents per 100 lb., the rates to the second territory above described should be graded with distance, reaching a maximum near the point where the terminal rate added to the local or proportional rate back meets the rate of 75 cents. Relief from the long-and-short haul rule of the fourth section as to rates from the Missouri river to the Pacific coast terminals will be afforded upon the following commodities in this list: Chloride of calcium; various iron and steel articles; billets, blooms, ingots, etc.; bolts, nuts, washers, etc.; and nails and spikes, etc.; pipe fittings and connections; cast-iron pipe and connections; wrought-iron pipe; pipe, cast iron and cast-iron connections for same; wrought-iron pipe; iron and steel articles; box straps, shingle bands, bailing ties; shoes—horse, mule and oxen; tubing, open seam, n. o. s.; strawboard, n. o. s.; ship and boat spikes; soda ash; tin and terne plate; wire and wire goods; wire, iron, plain, galvanized, etc.; wire rods; zinc (spelter); steel rails; rail fastenings.

If, however, the rate from the Missouri river to the Pacific coast ports upon any commodity covered by the above-described items is hereafter increased so as to equal or exceed 75 cents per 100 lb., such rate must be carried as a maximum to intermediate points. Upon all other schedule C commodities the rates made from Missouri river territory to the Pacific coast terminals should not be exceeded at intermediate points.

Carload commodity rates from points in zones 2, 3 and 4.—Of the articles in the list of commodities 90 per cent are rated in western classification as fourth or fifth class, in carloads, and more than 60 per cent are rated as fifth class, with a lower carload minimum than is here proposed. The differences by which the fifth-class rates from Chicago, Pittsburgh and New York exceed the rates from the Missouri river are 14, 24 and 34 cents, respectively, and the differences by which the fourth-class rates from Chicago, Pittsburgh and New York exceed the rates on the corresponding class from the Missouri river are 17, 29 and 42 cents, respectively. We are dealing here with a set of commodity rates materially lower than the rates on the classes to which these commodities belong, and the differentials to be applied from Chicago, Pittsburgh or New York should bear a reasonable relation to the rates from the Missouri river, having consideration for the additional and total hauls involved.

We are of the opinion that the petitioner's carload rates upon the commodities shown in schedule C, except those covered by the 27 items above referred to, and with the further exceptions of coal and pig iron, should be made from Chicago, Pittsburgh and Atlantic seaboard territories to the intermountain points by adding to the rates on the same commodities from the Missouri river to the same destinations differentials not exceeding 15 cents from Chicago, 25 cents from Pittsburgh and 35 cents from the Atlantic seaboard. The differential of 15 cents from Chicago over the Missouri river permits a ton-mile revenue of 6 mills for the haul of 500 miles from Chicago to Missouri river; 25 cents from Pittsburgh over the Missouri river rate permits a ton-mile revenue of 5 mills for the haul of approximately 1,000 miles from Pittsburgh to the Missouri river; and 35 cents from the Atlantic seaboard over the Missouri river permits a ton-mile revenue of 4.66 mills for the haul of nearly 1,500 miles from New York to the Missouri river. These differentials correspond approximately with the fifth-class differentials, and the rates applied from points in zone 2 should increase from the western to the eastern boundary of that zone, not exceeding at Mississippi river points the fifth-class differential of the Mississippi river over the Missouri river. They should increase from the western toward the eastern boundary of zone 3, not exceeding at the Cincinnati and Detroit points the amounts by which the fifth-class rates from these points exceed the Missouri river fifth-class rates.

Less-than-carload commodity rates.—There are about 50 items in this list on which l. c. commodity rates apply from all eastern defined territories to the Pacific coast. These less-than-carload rates vary from \$1.75 to \$1 per 100 lb. Eighty-five per cent of the commodities move on rates of from \$1.25 to \$1.50 per 100 lb. The table of rates quoted by the water lines from the Atlantic seaboard to the Pacific coast shows that the competition of these lines for the less-than-carload business has been and is likely to be just as severe as is the competition on the carload rates. This less-than-carload list is more varied in character than is the carload list, and comprises many articles in all the first three classes and a few in the fourth class. The 75-cent rate used as a minimum on the carload commodities is approximately 60 per cent of the rate on the class to which these commodities belong. These carload rates, however, apply on very large carloads of from 60,000 to 80,000 lb., while the carload minima to which the class rates usually apply are from 30,000 to 40,000 lb. This being the case, a lower rate may properly apply on the higher carload minimum.

We are of opinion that relief should be authorized on all articles rated as first or second class on which the proposed less-than-carload commodity rates from the Missouri river to

the Pacific coast are less than \$1.50 per 100 lb., and on all articles rated as third class or lower on which the proposed less-than-carload commodity rates are less than \$1.25. Relief will be denied in all other cases.

Less-than-carload commodity rates from Chicago, Pittsburgh and New York.—The differentials by which the rates from these points to intermountain territory exceed the rates from the Missouri river ought not to exceed 25 cents from Chicago, 40 cents from Pittsburgh and 55 cents from the Atlantic seaboard. These are the same differentials as apply on first-class traffic and are taken because the articles shipped are divided about equally among the three higher classes.

Commodity rates to points in territory 1.—This is the so-called back-haul territory just east of the terminals. Rates to many points in it are made by taking the rates to the Pacific coast terminals and adding thereto the local rate from the terminal to destination. The practice of thus making rates to these points had resulted in complaint on the part of the shippers. It is suggested that it would be better if rates to these intermediate points were made by adding to the terminal rate something less than the local rate or by making basing rates to the terminals less than the local rates to such points, to be used in connection with the local rates from the terminals in making through rates from eastern points.

It is believed that if the carriers were to put in effect one or the other of these schemes the policy of liberality to the interior towns would be to their own benefit. It would also result in extending to these towns the full benefits of the increased service by the canal. The commission does not feel that it would be best to make an order as to these rates at this time. The carriers are given 60 days, however, in which to submit a plan for the readjustment of the back-haul rates.

It is not considered necessary to apply the coast terminal rates to any points except the ports of call on the Pacific coast at which the Atlantic-Pacific steamship lines deliver freight.

ACCIDENT BULLETIN NO. 52

The Interstate Commerce Commission has issued Accident Bulletin No. 52, containing the record of railway accidents in the United States during the quarter ending June 30, 1914; and also the record for the twelve months ending on that day. In the quarterly statement the number of passengers killed in train accidents is given as 5, as compared with 13 in the last preceding quarter, and 21 in the quarter ending June 30, 1913.

From the annual records we copy, instead of the short table, No. 1, which we have usually given with the quarterly report, the larger table, No. 1 B, in which casualties to persons are shown more in detail.

Table 1 B does not include industrial accidents; adding these, the total number of persons killed during the year was 10,302, and of injured 192,622, as shown in the following table:

Casualties, Year Ending June 30, 1914

	Killed	Injured	Killed	Injured
Total of Table 1B.....	...	...	9,893	79,388
Industrial accidents to employees—				
Working on tracks or bridges.....	154	26,941		
At stations, freight houses, etc.....	70	26,126		
In and around shops.....	101	53,051		
On boats and wharves.....	22	1,788		
At other places.....	62	5,368		
			409	113,274
Total.....			10,302	192,662

In all of the items for 1914, except "other persons," not trespassing, there is a considerable decrease from the record of the year last preceding, as appears from table No. 1 C.

Annual table No. 2, showing the number of collisions and derailments, classified according to causes, etc., is given below.

Annual Table No. 1c—Comparisons with 1913 and 1912

Item	1914		1913		1912	
	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd
Passengers:						
In train accidents.....	85	7,001	181	8,662	139	9,391
Other causes.....	180	8,120	222	7,877	179	6,995
Total.....	265	15,121	403	16,539	318	16,386
Employees on duty:						
In train accidents.....	452	4,823	557	6,905	596	7,098
In coupling accidents.....	171	2,692	195	3,360	192	3,234
Overhead obstructions.....	89	1,490	94	1,835	77	1,523
Falling from cars.....	497	14,563	560	16,005	573	13,874
Other causes.....	1,314	27,273	1,533	28,514	1,482	23,391
Total, employees.....	2,523	50,841	2,939	56,619	2,920	49,120
Total, pass. and emp....	2,788	65,962	3,342	73,158	3,238	65,506
Employees not on duty.....	327	1,097	362	1,178	315	959
Other persons, not trespassing:						
In train accidents.....	9	148	9	110	13	277
Other causes.....	1,298	5,827	1,279	5,932	1,185	4,746
Total.....	1,307	5,975	1,288	6,042	1,198	5,023
Trespassers:						
In train accidents.....	75	178	90	174	91	151
Other causes.....	5,396	6,176	5,468	6,136	5,343	5,536
Total.....	5,471	6,354	5,558	6,310	5,434	5,687
Total, Table 1c.....	9,893	79,388	10,550	86,688	10,185	77,175
Industrial accidents.....	409	113,274	414	113,620	400	92,363
Grand total.....	10,302	192,662	10,964	200,308	10,585	169,538

The bulletin gives the usual tables classifying personal casualties in great detail, including two tables in which passenger trainmen are separated from freight trainmen; but the statement showing the number of employees in service, and the ratio thereto of certain classes of killed and injured, which appeared in the last annual bulletin (*Railway Age Gazette*, March 6, 1914, page 468) does not appear in the present bulletin. A table on

TABLE NO. 2—COLLISIONS AND DERAILMENTS, YEARS ENDING JUNE 30

Classes.	1914				1913				1912			
	Number.	Number of persons—		Damage to road and equipment and cost of clearing wrecks.	Number.	Number of persons—		Damage to road and equipment and cost of clearing wrecks.	Number.	Number of persons—		Damage to road and equipment and cost of clearing wrecks.
		Killed.	Injured.			Killed.	Injured.			Killed.	Injured.	
Collisions:												
Rear.....	815	80	1,671	\$988,388	1,143	183	2,251	\$1,380,064	1,142	117	2,019	\$1,292,886
Butting.....	484	100	1,966	817,518	682	157	2,921	1,266,415	704	157	3,136	1,314,232
Trains separating.....	397	8	94	175,499	474	5	194	204,702	353	4	138	144,495
Miscellaneous.....	3,545	99	2,145	1,793,874	4,178	112	2,665	1,917,591	3,284	100	2,656	1,578,594
Total.....	5,241	287	5,876	3,775,279	6,477	457	8,031	4,768,772	5,483	378	7,949	4,330,206
Derailments due to—												
Defects of roadway.....	1,888	66	1,987	1,516,343	1,959	70	2,230	1,583,929	1,877	102	2,766	1,541,460
Defects of equipment.....	4,186	50	1,074	3,358,088	4,366	49	1,245	3,421,037	3,847	68	1,197	3,165,033
Negligence of trainmen, signalmen, etc.....	426	19	461	314,065	515	23	452	306,163	423	18	548	238,589
Unforeseen obstruction of track, etc.....	318	52	439	410,268	369	79	791	980,104	412	61	595	478,675
Malicious obstruction of track, etc.....	58	14	155	87,985	62	8	131	74,046	75	16	378	109,614
Miscellaneous causes.....	1,689	117	1,445	1,503,153	1,778	105	1,685	1,909,163	1,581	129	1,663	1,664,081
Total.....	8,565	318	5,561	7,189,902	9,049	334	6,534	8,280,442	8,215	394	7,147	7,197,252
Total collisions and derailments.....	13,806	605	11,437	10,965,181	15,526	791	14,565	13,049,214	13,698	772	15,096	11,527,458

ANNUAL TABLE No. 1a—CASUALTIES TO PASSENGERS, EMPLOYEES, AND OTHER PERSONS—YEAR ENDED JUNE 30, 1914

Causes	Passengers						Persons carried under agreement						Total						Trainmen						Trainmen in yards						Yard trainmen						Switch and crossing tenders, etc.						Trackmen and bridgemen						Other employees						Total employees on duty						Employees not on duty						Other persons not trespassing						Total persons																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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page 36 gives the total number of accidents each year during the last 13 years, with the number of persons killed, the number injured, and the damage to road and equipment.

Thirty-seven pages of this bulletin are filled with the usual reports of accidents investigated by the agents of the commission since the last preceding quarterly bulletin. These accidents were as follows:

Georgia So. & Florida	Cordele, Ga.	Jan. 9	Derailment
Wabash	Attica, Ind.	Apr. 5	Derailment
Baltimore & Ohio	Wheeling J'n, Pa.	Apr. 10	Butting collision
Toledo & Ohio C.	Kenton, Ohio	Apr. 22	Rear collision
St. L. & S. F.	Mansfield, Ark.	May 5	Butting collision
Atlantic Coast Line	Palmer, Ga.	May 14	Rear collision
Chicago & N. W.	Crystal Lake, Ill.	May 17	Butting collision
Northern Alabama	Hayes Mine, Ala.	May 19	Rear collision
M. K. & T. of Texas	West Point, Tex.	May 27	Derailment
Baltimore & Ohio	Cook's Mills, Pa.	May 31	Derailment
Colorado & So.	South Park J'n, Colo.	June 1	Butting collision
A. T. & S. Fe.	Bagdad, Cal.	June 12	Butting collision
Hocking Valley	Starr, Ohio	June 13	Butting collision
Southern	Sadler, N. C.	June 14	Derailment
Southern Pacific	Conley, Cal.	June 15	Derailment
L. & N.	Moore's, Ky.	June 28	Derailment

All of the accidents investigated during the year are summarized and indexed in a table filling six pages.

Electric railways reporting to the commission (not included in the foregoing statistics) had 551 persons killed during the year and 6,108 injured; and there were 154 collisions and 78 derailments. Train accidents are charged with 28 fatalities. The total number of passengers killed from all causes was 58, and of employees 77 (28 in industrial accidents). The number of trespassers struck or run over by cars was 269; 161 killed and 108 injured.

COMBINATIONS IN RESTRAINT OF LEGISLATION

[From the New York Times]

Thirteen Eastern railways publicly announce a combination against full-crew laws. Fourteen Western railways presented to the Governor of Illinois a petition for the repeal of the two-cent fare law. In Oregon the farmers are leading in a protest against the full-crew law. In Missouri 112 members of the legislature have presented petitions signed by constituents urging an increase in passenger rates to 2½ cents a mile.

Through all these and many other signs of the new temper regarding the railways run two characteristics—first, the legislatures are untrue representatives of the people; and, second, the new friends of the railways are such for their own interests. It is because of tardy appreciation of the fact that the interests of the railways are the interests of the people that there are so many new protectors of the railways.

In this state the full-crew law was the work of a discredited administration, false to its trust in this and other respects. . . . The thirteen conspirators in the appeal from the oppressions of the legislatures of Pennsylvania and New Jersey propose to "submit the question directly to the public, that the people may determine what is just, right and fair." There was a time when the railways would not have dared to do such a thing. The railways have bowed to the laws, have repented their misdeeds and now feel that they have a standing to appeal both from persistence in misjudgment and from persecution in the name of reform.

There is pending a Federal full-crew law, and a "long-train" law is proposed in this state which would tend to make two trains do the work of one, and multiply crews accordingly. . . . The present campaign ought to have come before the existing laws were passed, but it comes with added force through the demonstration that the railways are fined to the disadvantage of their patrons under the pretense of "safety first." The true inspiration of such laws is the extortion of money from the railways on whatever pretext. . . . Will the legislatures dare to defend what they dared to pass?

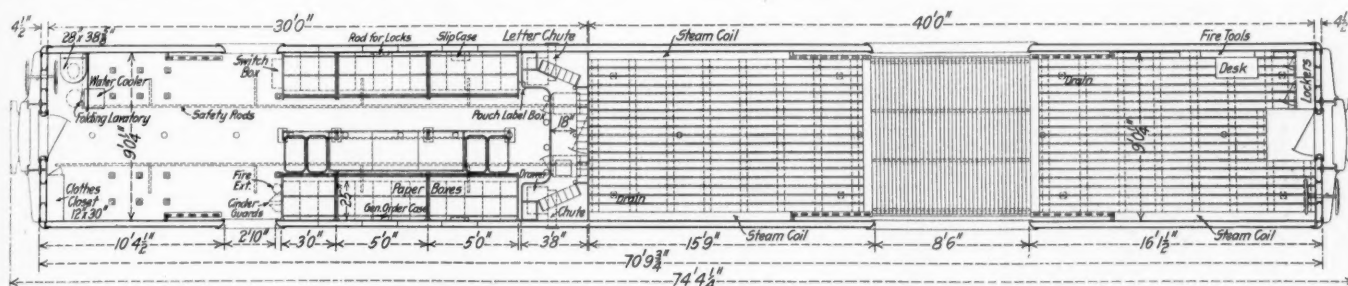
ANATOLIAN RAILWAY.—A message from Constantinople states that the construction of the extension of the Anatolian Railway from Angora to Sivas has been begun.

Jersey Central Steel Baggage and Mail Equipment

The Cars Are 70 Ft. Long, Weigh 144,700 Lb. and Conform to the United States Government Specifications

The Central Railroad of New Jersey has in service seven steel baggage and mail cars having a 30 ft. mail compartment equipped according to the United States Government specifications and a 40 ft. compartment for the transportation of baggage or express. These cars were built by the Harlan & Hollingworth Corporation, Wilmington, Del., are 70 ft. 9¾ in. long over end plates and

car. The web plates are 5/16 in. thick, and each has two 3½ in. by 3½ in. by ½ in. angles riveted to it, top and bottom, while riveted to the flanges of the four top angles is a 2 ft. 5 in. by ½ in. top cover plate. This plate is 65 ft. 3¾ in. long, and does not therefore extend the full length of the car. A bottom cover plate is not used.



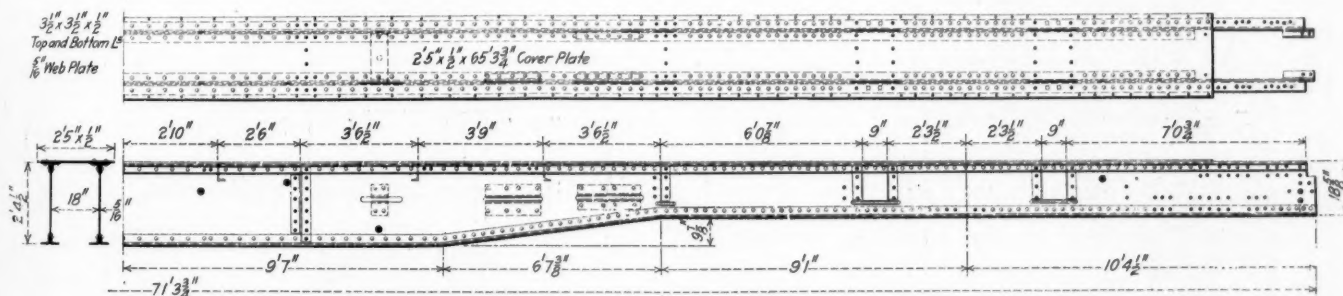
Floor Plan of the Jersey Central Baggage and Mail Cars

weigh 144,700 lb. each. They are mounted on six-wheel trucks equipped with the Commonwealth steel frame, and clasp brakes.

UNDERFRAMES

The center girder, which is the main member of the underframe, is of the fishbelly type, built up of steel plates and angles.

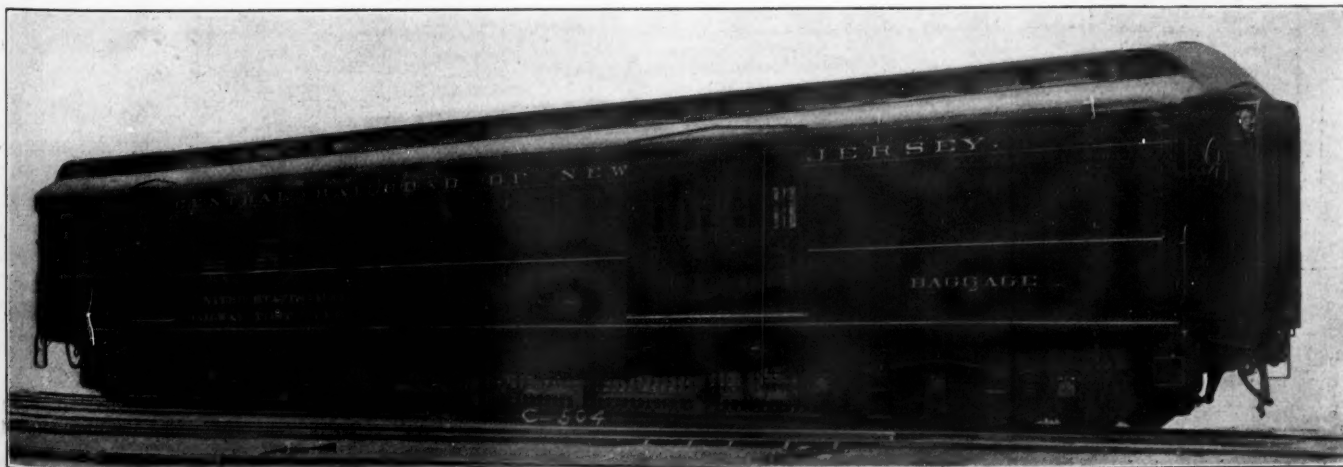
The two center crossbearers are placed 5 ft. 4 in. on either side of the center of the car, and are built up of diaphragms pressed from 5/16 in. plate, which are the full depth of the center sills at the inner end, while the lower flange tapers upward toward the outside of the car till a depth of 6½ in. is reached. A 5/16 in. pressed filler is also used between the webs



Center Sill Construction of the Baggage and Mail Cars

The two web plates are 2 ft. 4 in. deep at the center of the car, and are spaced 18 in. apart; this depth is maintained for 9 ft. 7 in. on either side of the center of the car, at which point the web plates begin to taper, and at a point 6 ft. 7¾ in. farther on they reach a depth of 18½ in., which is maintained to the end of the

of the center sills, and the crossbearers are finally reinforced by a 6 in. by ¾ in. cover plate at the bottom and a 9 in. by ¾ in. cover plate at the top, both extending across the car. The two intermediate crossbearers are spaced 16 ft. 2 in. on either side of the center of the car and the diaphragms, which are 14 in.



Steel Baggage and Mail Car in Service on the Central Railroad of New Jersey

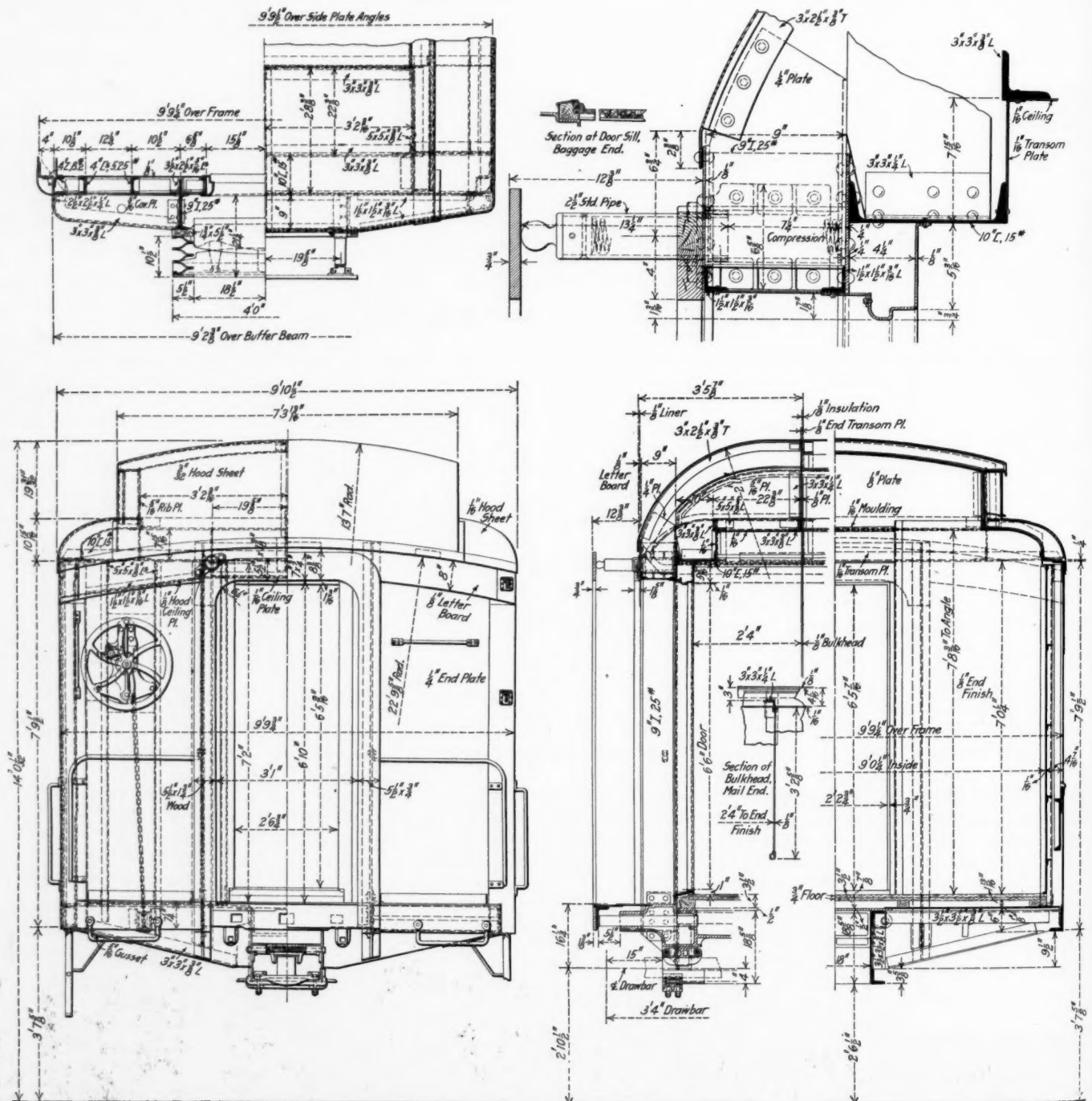
deep at the inner end and $6\frac{1}{8}$ in. deep at the outer end, are pressed from $5/16$ in. plate with a $5/16$ in. pressed filler between the webs of the center sills. A top cover plate 9 in. by $\frac{3}{8}$ in. is used on the intermediate crossbearers as well as a 6 in. by $\frac{3}{8}$ in. bottom cover plate, both extending the full width of the car.

The double body bolsters are spaced 50 ft. $6\frac{3}{4}$ in. between centers and consist of two members whose centers are 2 ft. 8 in. on either side of the center of the center plate. These members

ties or floor supports consisting of 6 in., 8 lb. channels are used, and extend between the center and side sills. The side sills are 6 in. by $3\frac{1}{2}$ in. by $7/16$ in. angles and extend the full length of the car.

END CONSTRUCTION

The end construction is of the dummy type. The corner post of the car is a 4 in. by $3\frac{1}{2}$ in. by $\frac{3}{8}$ in. angle to which is riveted a 4 in., 8.2 lb. Z-bar, and a $2\frac{1}{2}$ in. by $2\frac{1}{2}$ in. by $\frac{1}{4}$ in. angle is also riveted to this Z-bar as shown in the drawing of the end



ward at the end of the car. A 4 in., 5.25 lb. channel with the flanges toward the outside of the car and its back placed 65 $\frac{1}{8}$ in. beyond the center of these two angles forms the door post. The main vertical buffing members are 9 in., 25 lb. I-beams, and are riveted to the two connected angles referred to above. An end buffing sill construction of 3 in. by 3 in. by $\frac{3}{8}$ in. angles and 5/16 in. plate extends between this I-beam and the corner of the car. The end members are connected at the top by a 10 in., 15 lb. channel, extending across the car with the flanges turned upward.

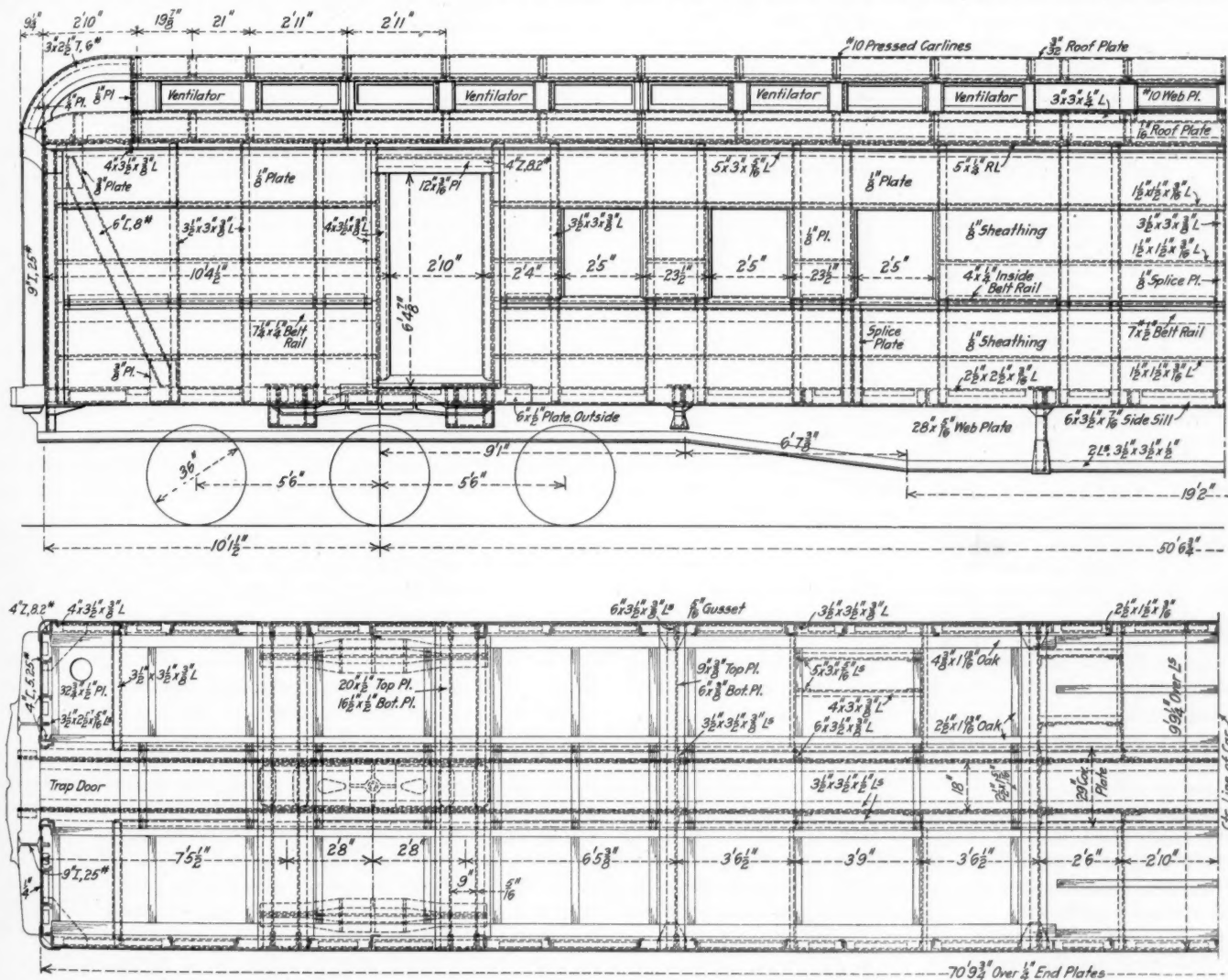
BODY FRAMING

The baggage doors have an opening 8 ft. 6 in. wide by 6 ft. 2 $\frac{1}{8}$ in. in height, while the side doors in the mail end of the

OTHER DETAILS

The trucks are of the six-wheel type, have clasp brakes and are fitted with the Commonwealth cast steel frame, which is 15 ft. 6 in. long over all. The truck wheelbase is 11 ft. and the journals are 5 $\frac{1}{2}$ in. by 10 in. M. C. B. standard. The wheels are Midvale solid steel and are 36 in. in diameter.

The floor in the mail compartment is of $\frac{1}{8}$ in. steel plate with 3-ply Salamander insulation and double wood floors, the bottom floor being $\frac{3}{4}$ in. yellow pine, while the top floor is $\frac{3}{4}$ in. maple, 1/16 in. insulating paper being placed between the two layers. In the baggage end the floor is of Flexolith composition laid on Keystone metal with $\frac{1}{8}$ in. floor plates and covered with yellow pine grating. There is an oak flooring at the doorway laid cross-



Arrangement of the Members of the Body Frame and Underframing

car are 2 ft. 10 in. wide and the same height as the side doors in the baggage compartment. There are 6 in., 8 lb. channel diagonal braces used between the top of the corner posts and the bottom of the first side post on either side of the car as well as between the top of the door post and the bottom of the side posts next adjoining. The belt rail is 7 in. by $\frac{1}{4}$ in. plate from the door posts to the corners of the car and 7 in. by $\frac{1}{2}$ in. plate between the doors; and the side posts are 3 $\frac{1}{2}$ in. by 3 in. by $\frac{3}{8}$ in. angles; the side sheathing is $\frac{1}{8}$ in. plate. The side door posts are 4 in. by 3 in. by 5/16 in. angles connected at the top by 4 in., 8.2 lb. Z-bars. The side plate is a 5 in. by 3 in. by 5/16 in. angle, to the upper flange of which is riveted a 5 in. by $\frac{1}{4}$ in. plate with a 2 $\frac{1}{2}$ in. by 2 $\frac{1}{2}$ in. by $\frac{1}{4}$ in. angle above this. The deck sill is a 3 in. by 3 in. by $\frac{1}{4}$ in. angle, and the carlines are pressed from No. 10 steel plate. The lower deck roof plates are 1/16 in. thick and the upper deck plates are 3/32 in. thick.

wise of the car. The inner side of all the outside plates throughout the car is lined with 3-ply Salamander insulation, while the outer side of all the inside plates in the mail compartment is insulated with the same material, excepting the ceiling plates, which are insulated by Agasote strips between the plates and the carlines. There is no insulation on the inside finish in the baggage compartment. The mail compartment is sheathed on the inside with 1/16 in. steel plates on the sides and No. 16 gage plates on the upper ceiling. The lower ceiling is covered with No. 20 gage plate, while the ends are sheathed with $\frac{1}{8}$ in. steel plates. This same arrangement is followed in the baggage compartment.

The special equipment includes Gould couplers, centering devices and friction draft gear; Miner friction buffing gear; Ajax vestibule diaphragms; Standard Heat & Ventilation Company's vapor system of heating; Safety Car Heating & Lighting Com-

pany's axle light equipment and lighting fixtures; Edison storage batteries; Adams & Westlake Company's folding lavatory; Westinghouse air brake and signal system; American slack adjusters; Ward ventilators and Gould journal boxes.

REPORT ON GRAY-THURBER TRAIN CONTROL SYSTEM

The report of H. W. Belnap, chief of the division of safety, of the Interstate Commerce Commission,* was sent by the commission to Congress, on January 9, as a supplement to its annual report; and as printed by Congress it includes a report, filling 30 pages, together with a number of illustrations, giving the conclusions of the division of safety on the Gray-Thurber automatic train control system, which was subjected to a series of tests on the Pennsylvania Lines West of Pittsburgh, in April, May and June, 1914. This apparatus was first tried in 1905, but was taken out; and experiments were resumed in 1911. In 1912 the Block Signal and Train Control Board made some tests, which were continued by the present engineers of the commission, after the abolition of the board. A report was made in July, 1913, but changes were made in the apparatus and then the work was gone over again. The present report is in some respects conditional, and the proprietors have proposed a number of further changes, which are noted at the end of the report.

This is an electrically operated system, the principal distinctive feature being the insulation of a truck of the tender from the frame of the locomotive; this for the purpose of regulating the conveyance of electric signals from the roadside to apparatus on the engine by means of wires connected to the rails. At each signaling point there is a short section—66 ft.—insulated at both its ends. The insulated track section is sufficiently long to permit the engine, exclusive of the tender, to stand between the insulated joints.

The insulation between the tender and its truck is made of two sheets of fiber, with a metal detector plate between them, the plate being included in an electric circuit so that broken-down insulation will de-energize a relay on the engine, and thus provide against false-clear signals. The side-bearing plates, the brake hangers, and the rear drawbar of the tender are also insulated, and all the bolts are included in the detector circuit. There is an insulator in the brake rod and also in the uncoupling chain at the rear of the tender. There are two sets of circuits on the engine, with a storage battery for each. On the roadside there is the usual track battery and a detector battery, the latter being used to energize a polarized relay. A Boyer speed indicator is used to make the apparatus inoperative at a certain predetermined low speed. The proper performance of certain functions in the apparatus depends on having the circuit of the track battery always of one polarity.

Following are the conclusions of the report:

CONCLUSIONS

I. The system as installed and tested constitutes a material improvement as compared with other arrangements of the same system previously tested.

II. With the installation of this system the following features must be provided:

1. All insulated joints, except the opposite insulated joints required at the entrance to each block section, must be staggered a distance equal to the longest distance between front tender wheels and rear locomotive wheels of all locomotives equipped; all other rail joints must be properly bonded.

2. Means must be provided to insure that track batteries will not oppose the detector batteries, and that the battery in the primary engine circuit will always oppose the detector batteries.

III. The system is deficient in the following respects:

1. The use of sand in starting trains will cause undesirable

stops or "safe failures" of the system unless the pick-up key is held closed.

2. False-clear failures of the system may occur, due to (a) a ground on wire S-102; (b) bridging the tender drawbar insulation, or an electrical conductor from tender body or frame to car truck or steel car in the train; (c) intermittent low resistance ground on short insulated rail section; (d) intermittently broken-down insulated joint; (e) foreign current in the track rails.

3. Protection against certain dangerous conditions and against failures or defects of apparatus at one point is transmitted to the signal location in the rear; if these conditions arose or failures or defects occurred after an approaching train had passed the entrance to the block section in rear, protection would not be afforded in time to be of any avail.

The tests conducted have resulted in the accumulation of a large amount of data which should be useful in further development of the system. Such further development, however, can not properly be made by means of experimental tests with only one locomotive and but few locations equipped, and covering but a comparatively short period of time. Properly to develop a system of this character to meet all the needs of actual service it should be installed and used for the purpose intended.

Notwithstanding the defects and deficiencies pointed out in this report, the system in its present state of development, if properly installed and maintained as an adjunct to a block-signal system, would increase the safety of train operation.

REVISED APPARATUS

Following the conclusions, Mr. Belnap says:

During the conduct of the tests and since their completion the proprietors of this system have proposed certain revisions in the apparatus employed. None of these revised arrangements has been thoroughly tried out. Briefly, the proposed changes consist essentially of the following:

In order to insure that current from track batteries will always flow in the proper direction to allow the system to provide protection against broken-down insulated joints, all track relays should be polarized. The proprietors also stated that polarized track relays were not employed in this installation for the reason that the railroad company had not used them heretofore in this territory and the understanding when the installation was made was that the existing block-signal system must not be interfered with.

With the installation of this system as an adjunct to an automatic block-signal system, some of the functions performed by relays provided for that particular purpose in the installation tested would be accomplished by utilizing relays of the signal system.

An electro-pneumatic valve, having relay points attached to its armature, has been designed, the purpose being to combine the functions of engine relay, magnet valve, and brake valve in one instrument, and to eliminate one set of engine circuits.

It is intended to locate the speedometer in the box or case on the tender and to include the speedometer frame and metal parts of valves in the detector circuit for the purpose of detecting the grounding of any wire.

The electrical contacts attached to the speedometer are intended to be closed when the rate of speed is between 1 and 15 miles per hour, and at these low speeds the train-control valve is intended to be maintained energized through speedometer contacts for the purpose of obviating undesirable stops due to the use of sand.

RAILWAY CONSTRUCTION IN BRAZIL.—The Brazilian Chamber of Deputies has authorized the government of Brazil to contract with the concessionaires of the Paraguayan Northeastern Railway for the prolongation of the lines of that company so that they will connect with those of the Brazilian Railway system. This will mean direct railway communication between Asuncion and Rio de Janeiro.

*Noticed in the *Railway Age Gazette*, January 17, 1915, page 99.

Value of a Locomotive in Terms of Earning Capacity*

Its Consideration Suggests Possibilities of Improving Present Practice; Importance of Reducing Shop Time

BY GEORGE S. GOODWIN

Mechanical Engineer, Chicago, Rock Island & Pacific, Chicago, Ill.

Consideration of the potential value of locomotives, expressed in terms of average daily earning capacity, suggests several important possibilities for the improvement of general practice, which it is the purpose of this paper to discuss.

For the fiscal year ending June 30, 1913, the total operating revenue from 251,277 miles of railroad was \$3,181,177,898, divided as follows:

Freight	\$2,203,860,284....	69.28 per cent
Passenger	716,174,021.....	22.51 per cent
Other transportation revenue.....	224,939,393....	7.07 per cent
Total revenue from transportation.....	\$3,144,973,698..	98.86 per cent
Non-transportation revenue	36,204,200....	1.14 per cent
Total operating revenue.....	\$3,181,177,898...	100.00 per cent

This revenue was produced by the use of 63,198 locomotives having an average tractive effort slightly over 30,000 lb. If it is assumed that 11 per cent of these locomotives are in the shop receiving repairs, 56,246 locomotives are left to earn the above revenue. Dividing the total revenue from transportation by the number of engines gives nearly \$56,000 per year, or \$153 per day, as the gross earnings of an engine. Applying to this figure the operating ratio, 71.33, we have \$44 per day as the net earning power of the locomotives of the United States. This figure includes all locomotives and the net earning power for freight locomotives alone would be somewhat higher than this. This money was earned after the locomotive had paid for repairing the track, the cars and itself.

The most notable thing about these figures is that nearly 99 per cent of the total operating revenue of the railways is received from the operation of trains, for the successful operation of which there are three essentials, namely:

Locomotives to move the trains, which is the subject of this paper.

Equipment to carry the tonnage.

Track on which to move the trains.

No two essentials are of any benefit without the third, and the importance of all three is shown by the fact that for the fiscal year ending June 30, 1913, \$544,000,000 was spent for maintenance of equipment and \$538,000,000 was spent for maintenance of way.

In order to show the monetary value of a locomotive more clearly, statistics were obtained from 24 of the larger roads in the middle and western states for the fiscal year ending June 30, 1913. The average gross earnings of freight locomotives, excluding 11 per cent in shops, is \$189 per day; applying the operating ratio given above for all roads, the net earnings for freight locomotives are \$54 per day, as against the \$44 already shown for all the roads of the United States. It was found that the average rate per net ton-mile accounted for the fluctuation in the value of a locomotive. A locomotive capable of earning \$75 per day on one road may be able to earn only \$40 per day on some other road, and this is further affected by the size of the engine, the amount of work for it to do, etc.

The value placed on a locomotive when rented of course varies on different roads, both as to the amount and as to the basis of computation. (Invariably running repairs are taken care of by the borrower, and general repairs by the lender.) Some use the size of cylinder, and others the weight on drivers or total tractive effort in computing this value. The general minimum charge is \$10 per day, increasing to from \$25 to \$40 for the modern engine. Two of the roads from which this information was solicited base the rental on a fixed charge per 1,000 lb. tractive

effort, a good average being 50 cents per 1,000 lb. Five roads base their rental charges on the interest and depreciation figured on the value of the locomotive in question. To this is added charges for general repairs, taxes, insurance, and profit on the transaction. An example of this with the profit omitted will show what might be termed "out of pocket" value of a locomotive. The following table shows approximately what this would amount to for different original costs between \$10,000 and \$30,000 with assumed charges for interest, depreciation, taxes, etc., and repairs. The charges for repairs are based on the assumption that 100 miles represents a day's work for a locomotive.

RENTAL PER DAY, BASED ON INTEREST, DEPRECIATION, TAXES, INSURANCE AND REPAIRS

Original cost	Interest at 5 per cent	Depreciation at 5 per cent	Taxes and insurance at \$1.09 per \$100	Repairs on basis of 100 miles per day	Total
\$10,000	\$1.37	\$1.37	\$0.30	\$7	\$10.04
15,000	2.06	2.06	0.45	8	12.57
20,000	2.74	2.74	0.60	9	15.08
25,000	3.43	3.43	0.75	10	17.61
30,000	4.11	4.11	0.90	11	20.12

Of the four methods, namely, size of cylinder, weight on drivers, rate per 1,000 lb. tractive effort, and the interest and depreciation method, the last two are more accurate and the third is more simple. One must admit, however, that the last discriminates between the modern, highly efficient engine and the older engine which is less efficient. The modern engine with the latest devices to give more economical performance certainly is worth more than the same size engine built ten or even five years ago.

We have thus developed three measures of the value of a locomotive, viz.: What it can actually earn; what it is worth from an investment standpoint, or what might be termed the "out-of-pocket" value, and what it is usually rented for. We have shown also that 99 per cent of the total operating revenue is produced by these locomotives while moving trains. This brings us to another phase of the problem.

An engine only earns money while it is moving freight, and is unproductive when not working. In order to bring out forcibly the actual miles an engine makes per day, I have taken from the reports of the Interstate Commerce Commission the freight revenue miles for a few roads and from this ascertained the average miles per day the engines on those roads make. These are, of course, approximate, but since all are taken the same way, the results are probably fair to all. To say the least, the results are startling and were it not that the sources of information are unquestionable it would sound very reasonable to argue that an average of 57 miles per day or 4 hours at 14 miles per hour is ridiculous. On the road with which I am connected a study has been made of just how a freight locomotive day is spent. A special form or report,* developed under the direction of N. D. Ballantine, assistant to the second vice-president, which accounts for every movement of the locomotive during the day, was used for this purpose. Reports are made independently by the round-house foreman, yardmaster and train conductor, and these are combined with the information regarding the engines in the shop into a single report which is summarized for the month. This report was described in an address by Mr. Ballantine before the Rock Island Railway Club and later printed in the July number of the Rock Island Employees' Magazine. (In comparing the data with other lines great care should be taken to know on just what basis their data is prepared, and unless the information

*An abstract of a paper presented before the Western Railway Club, February 16, 1915.

*See *Railway Age Gazette*, October 27, 1911, and October 25, 1912, for descriptions of these reports.

is developed from a similar record, its accuracy may be open to serious question.) The following is an analysis of these reports for the month of October, 1914:

FREIGHT LOCOMOTIVES

Mechanical Department Care

Roundhouse	6 hr. 49 min.	28.40 per cent
Running repairs	2 hr. 41 min.	11.18 per cent
Classified repairs	3 hr. 27 min.	14.38 per cent

Total mechanical department.....12 hr. 57 min....53.96 per cent

Terminal Detention

Regular schedule	2 hr. 55 min.	
Stock, fruit, vegetables.....	7 min.	
Superior trains	3 min.	
Insufficient tonnage	20 min.	
Main line obstructed		
Rest for crews	7 min.	
Miscellaneous	14 min.	
Time between call and departure.....	16 min.	

Total terminal detention

Time Between Terminals

Actual running time.....	4 hr. 16 min.	17.78 per cent
Meeting trains	53 min.	(mi. per day 68)
Station work	1 hr. 20 min.	
Track conditions	1 min.	
Sixteen-hour law	1 min.	
Accidents, etc.	1 min.	
Block signals	2 min.	
Engine failures	2 min.	
Car failures	3 min.	
Weather conditions		
Miscellaneous	22 min.	

Total time between terminals.....7 hr. 1 min....29.24 per cent

Total time accounted for.....24 hr.100.00 per cent

This brings out clearly the following points:

- An engine is in the hands of the mechanical department being made ready to move tonnage 12 hr. 57 min....53.9 per cent
- An engine is in the hands of the transportation department ready to move tonnage.....6 hr. 47 min....28.3 per cent
- An engine is actually moving tonnage and therefore earning money, only.....4 hr. 16 min....17.8 per cent

This brings us to the third division of the paper, viz.: What can be done to make the engine more available for handling tonnage? This same thought is very aptly stated by George R. Henderson, quoted in Bulletin No. 60 of the Baldwin Locomotive Works. Mr. Henderson believes in "wearing out the locomotives as fast as possible, not by improper treatment or careless maintenance, but by the legitimate work of hauling trains. The faster they can be worn out the sooner they will be replaced with modern engines, and the strides made in power and type of locomotives in the past few years have been such that an engine only 10 years old is of comparatively little use, except for branch service."

In the example of the distribution of a locomotive day the roundhouse is charged with 6 hr. 49 min., or 28.4 per cent of the day. There are several items in connection with this work in the roundhouse which will suggest opportunities to reduce the time. Improved dump grates, good ash pan designs, properly maintained turntables, and hot water boiler washing systems are all vital factors in reducing the time in the roundhouse. Good inspection is necessary in order to save failures on the road. Inspection pits have been found to be advantageous, especially when engines are to be turned quickly and have not time to be placed on the roundhouse pit. There should be enough men in the roundhouse to do the work needed and the machine shop of the roundhouse equipped with adequate tools.

Running repairs are charged with 2 hr. 41 min., or 11.2 per cent of the day. This item, no doubt, will vary closely with the time an engine has been out of the shop, and with the thought in mind of reducing the running repairs the road with which I am connected has reduced the mileage between shoppings. Changes in design have been instituted with a view to eliminating the running repairs. With the advent of the gas and electric welding outfit it has been possible to make many repairs at a saving in cost and time that heretofore would not have been possible.

All roads have some form of report showing failure of engine parts. On our line this is tabulated under the different detail parts, and a monthly report which shows the nature of the fail-

ure and the numbers of the engines making the failures. This is watched closely and when any particular class of engines shows a repeated weakness in any particular detail we study it with a view to correcting the design and overcoming the trouble. After the engine has made its mileage it gets a general overhauling and wherever possible we make our engines pull a train to the point of shopping. If it be assumed that an engine receives general repairs every 18 months and that 60 days is the average time the engine is out of service, that means that 11 per cent of the engines are always in the shop. Sixty days multiplied by \$44 equals \$2,640, the loss while the engine is in the shop.

Everyone knows there are ups and downs in the traffic movement, and during the slack business when locomotives are not needed to move trains it is obvious that we should put them through the shop, provided, of course, that they are ready for the shop and the shop can take care of them. When an engine is about to go to the shop many railroads, ours among them, make a practice of sending advance notice to the shop of just what material will be needed. On firebox work 30 days' advance notice is desirable, so that the new firebox will be ready to put in as soon as the old one can be cut out.

After the engine reaches the shop what improvement can be made there with a view of cutting down the time in the shop? The first thought is modern shop facilities, and considering that an engine is worth \$44 per day, it ought not to be difficult for anyone to show substantial savings by the use of more modern shops. Assume that a shop can turn out 360 engines per year, and that by making certain changes the time per engine could be reduced four days; assume further that for three months of the year there is sufficient business to provide work for these engines just as soon as they are turned out; the saving then will be 90 engines multiplied by four days, or 360 engine days, which at \$44 per day equals \$15,840. In addition to this, repairs can be made more cheaply in the modern shop and the capacity of the shop is increased in this specific case 6.7 per cent.

When one considers that the average locomotive is worth \$44 per day it is a simple problem to calculate what the lack of material means in engine delays. For this reason the mechanical department and the stores department should co-operate with each other with a view to having the necessary material on hand. A great deal of this material for which engines are delayed is of very moderate price, so that no great valuation is involved, and in practically all cases this class of material is common to several engines. Too often the fact seems to be lost sight of, that an engine is worth money, and only the fact is seen that there is so much invested in stock, without regard to whether the equipment can be repaired promptly.

While this paper has dealt particularly with what improvements the mechanical department can make in the engine performance, the study of the locomotive shows a remarkable opportunity for all concerned to aid in its work by co-operation. This includes all departments having anything to do with the movement of trains, or the equipment necessary for the movement of trains.

BUSINESS ON THE BUENOS AIRES SUBWAY.—The Compagnie Générale de Tramways de Buenos Aires, of Brussels, reports, with regard to the first section of the underground railway of the Anglo-Argentine Tramways Company in Buenos Aires, which was opened for traffic in December, 1913, the length being 4.2 miles, that during the first nine months of operation the average receipts, if applied to a whole year, would amount to \$138,000 a mile per annum, as compared with \$93,600 in Paris, \$67,200 in London, and \$141,600 in New York. As a consequence of the financial crisis in Argentina the construction of the second underground section has been indefinitely postponed, although the hope is expressed that an extension of time will be granted by the authorities. The European war has reacted unfavorably on Argentina.

Arbitration of Engineers' and Firemen's Demands

Testimony of J. W. Higgins on Schedule Provisions; Work of Firemen and Hostlers; Present Cost of Living

J. W. Higgins, general manager of the Missouri Pacific, was the principal witness last week at the hearing at Chicago before the board of arbitration on the wage demands of the engineers and firemen on the western roads. Mr. Higgins testified in connection with Exhibit 38, outlining the development of the various schedule provisions, to show that many of them were adopted to meet local conditions and practices of years ago which no longer exist, but that the railroads have been unable to get rid of the rules and that now the brotherhoods are seeking to have them applied generally.

For example, he said, "We have a rule on the Missouri Pacific providing that the engineer need not run his engine between the trains and the roundhouse. If he does he gets one hour's pay. This single rule cost the Missouri Pacific \$256,696 in 1914, or eight per cent of the total wages paid to engineers and firemen. The rule was brought about in the early days under pioneer conditions when, because of the prevalence of desperadoes and the resulting danger by night to men who had to walk to and from the roundhouse, the hazard was so great that the men secured a provision that someone at the roundhouse would run the engines in and out. The Kansas City roundhouse was in an inconvenient location and the men had to walk across a long bridge to reach it, and they feared to take the risk. All the reasons for the rule have been removed but the men not only insist on its retention but now demand its universal application. The Missouri Pacific has often tried in vain to get relief from this burdensome rule and in the present arbitration cannot secure relief because the brotherhoods have succeeded in limiting it to only their side of the question."

EARLY SCHEDULE PROVISIONS

The exhibit outlined the development of the schedules on the Chicago & North Western, Chicago, Milwaukee & St. Paul, Missouri Pacific-Iron Mountain System and the Northern Pacific. Mr. Higgins said it had been intended to compile an exhibit that would show the growth of schedules on all the railroads involved in the movement, but that it was not possible to do so because of the absence of records on most of the roads. Prior to the eighties, Mr. Higgins said, locomotive engineers were paid by the month, trip or day, without overtime, generally speaking, in the western territory, although in 1877 the Chicago & North Western made an agreement to pay extra time for mileage above 2,600 miles in any one month. In the early schedules rates only were named and there were no compensatory rules. Only miles were considered in the makeup of a day, or trip.

In 1880 on the North Western the rate of pay for engineers in road service for the first six months of service was \$2.75 a day; for the second six months \$3 a day; for the third six months \$3.25, and for the fourth, \$3.50; for the third year and thereafter the rate was \$3.70. For yard service the rate was \$2.75 a day. There was no differential between freight and passenger service or for any difference in the type of engine.

In the first printed schedule of the Missouri Pacific-Iron Mountain system, dated 1885, the basis for a day's work was 100 miles or less, in 12 hours or less, both freight and passenger service, and time began one hour after the man was called. There was an overtime rate of 35 cents an hour, applying after 12 hours of continuous service. Prior to the adoption of this schedule the men had been paid on a straight mileage basis, without relation to the time; then, on account of the number of short runs, it was recognized that even

if a man's run was less than 100 miles he should be paid for a day's work, for 12 hours' service or less.

TERMINAL DELAY RULE

The provision for payment for terminal delay was first made in 1892. This rule provided that in case engineers were held on duty more than one hour at terminal points after the time fixed for the departure of their trains or more than 30 minutes after arrival at terminals, they should be paid for such delay at 35 cents an hour, but that such time should not be counted in computing overtime. In case the delay, before leaving exceeded one hour, or after arrival exceeded 30 minutes, payment was to be made for the entire delay based on actual minutes. Mr. Higgins said that although the hostler rule was intended in part to take care of some of the things that the initial and final terminal delay rule took care of, the adoption of the new rule had no effect in relieving the road from the responsibilities of the previous rule. Under the hostler rule, if an engineer takes his engine from the roundhouse to the train, which may often be done in 10 or 15 minutes, he is paid for one hour's time. If, for any reason, the train is delayed an hour he gets another hour's terminal delay, and although he might make 150 miles in the next five hours he would get the arbitrary allowance in addition to the payment for his mileage. The managements at various times have made efforts to get relief from that rule, but have not succeeded. The terminal delay rule was a remedial rule, and provided for a basis of less than the pro rata rate, whereas the demands now under consideration require the full pro rata rate.

On December 1, 1901, rates were classified on a cylinder basis, and a classification based on cylinder dimensions has continued until the present time. The men are now asking for a classification based on weight on drivers. At the same time a differentiation was made in the rates for local and through freight service, and a very material increase was made in the rates. In 1903 there was a further revision of rates and rules which involved a number of increases in rates. The switching service was put on a 10-hour instead of a 12-hour basis, an arbitrary allowance was provided for grades on the line, and a deadheading rule was adopted. A special allowance of one hour for crossing the Eads bridge at St. Louis and two hours for crossing the Merchants' bridge was adopted, so that the men are paid both for the mileage and for the arbitrary allowance. As an illustration Mr. Higgins mentioned the local passenger run between St. Louis, Mo., and Herrin, Ill. A train leaves St. Louis at 4:00 p. m. and arrives at Herrin at 9:35 p. m., in 5 hr. 35 min. The distance is 133 miles, for which the engineers are paid at the rate of \$4.40 per hundred miles, or \$5.41, and they also are paid for one hour for taking the engine to the train at St. Louis, 44 cents, for a distance of less than one mile; one hour for taking the engine from the train to the side-track at Herrin, which Mr. Higgins said would not take 10 minutes, and one hour for crossing the Eads bridge, a total of \$6.73, in spite of the fact that the men are guaranteed a day's pay. Some of the Missouri Pacific's competitors do not have such rules.

The next revision was on November 1, 1905, when a rate was made for Consolidation engines and other special rates were fixed. Another revision was made effective in February, 1907, as the result of the first concerted movement of engineers in the western territory. This was a general upward revision of rates and a number of new rules were adopted. Effective December, 1910, as the result of another concerted movement, the rates were again increased about 10 per cent

and a number of additional changes in the rules were made.

To show that many of the rules now in existence were originally created to provide for some special conditions which no longer exist Mr. Higgins said the terminal delay rules were brought about by the fact that men were often delayed for many hours and otherwise would not have been paid for their time; but now such long delays are very infrequent, and the rule is out of place.

"Then if there is no delay," said Mr. Burgess, one of the arbitrators, "it does not cost the company anything even though the rule is in the book, does it?"

"You do not have to delay a man in order to have him claim payment," replied Mr. Higgins. "He arrives at his final track in his final terminal yard, and he can claim the time that is actually necessary to take the engine from there to the roundhouse, under the proposed rule. That is why this proposal cannot be compared with the old remedial rule. I was in the service at the time the original rule for final and initial terminal delay was adopted, and I know that we were often laid out for hours getting into the yard, and that we were called and were delayed for hours sometimes in getting out. Naturally the men felt that there was no need of such slowness, and the officers very readily agreed to put in the rule, but now the men say that the trip does not commence when they get on the engine at the roundhouse. They first must have 30 minutes preparatory time before they get on the engine before they leave, and they must have the actual time necessary—not the delay time—but the time necessary—to get from that track to the outer switch of the yards from which they are to leave with the train. There are two special allowances. Then they say the trip commences at the outer switch and ends at the switch of the yard at the final terminal. Then they want another allowance from that yard to the roundhouse, the actual time after they arrive. That is far removed from the thought we had at the time we got the rule."

Another rule adopted to meet a special condition, he said, provides that if an engine fails and is returned to the terminal the engineer may go out on another run inside of five hours and combine the mileage of the two runs; but if he is sent out after five hours he gets a day's pay for the first performance, even if it were only a few miles, and then another day for the second run. This rule was adopted on account of the case of a man who had run four miles and returned with his engine, turning it into the roundhouse and claiming an automatic release and payment for 100 miles. The road held he was not automatically released, and after a great deal of negotiation the present rule was adopted.

Similar testimony was given regarding the development of firemen's schedules. In 1885, the Chicago & North Western was paying \$55 a month for firemen in road service and \$1.75 a day in yard service. Mr. Higgins also gave the dates on which both engineers and firemen were relieved of various incidental duties in preparing their locomotives for service before going out. He gave data also to show that the enginemen's wage movements usually have resulted in cycles of wage advances to other classes of employees both within and without labor organizations. There are relations between the pay of engineers and all the others, he said, and if they get an advance, a disproportion results until other classes are raised proportionately. Engineers have always received more than other employees and the firemen's pay in recent years is greater in proportion to the engineers' pay than ever before, but the relation of most classes of employees to the engineers has remained practically the same for 20 years.

ENGINEERS PAID MORE THAN OFFICERS

W. L. Park, vice-president of the Illinois Central and one of the arbitrators, asked Mr. Higgins whether, if the matter were left to his judgment as an officer, he would not make these adjustments a little differently, giving some classes a

little more and some classes a little less. Mr. Higgins replied that there are a number of positions in the different classes of service that should probably receive more consideration and that if the engineers and firemen had not received such large increases there would have been more money for the others.

"Have you technically educated men, or men in authority over enginemen, who receive less pay than they do?" asked Mr. Park.

"Many of them," replied Mr. Higgins. "We have superintendents of divisions on our road who draw smaller compensation than the engineers to whom they give orders, and roundhouse foremen, master mechanics, train dispatchers and other men who have direct supervision over them often receive less than the engineers. There has been a tendency in recent years to get very much out of line in that direction. Conditions have become very much distorted, and it is very detrimental to the railroad service. Many officers, who cannot be members of labor organizations and who must stand wholly on their merits are handling men who not only draw more money than they; and they do not have a grievance committee at their beck and call to defend them when they get into trouble of any kind. I think it is very unfortunate that we have reached that stage in the railroad business. There are many cases where an engineer is eligible for promotion, but refuses to take an official position because he would lose money by it. The management has difficulty in making an equitable adjustment of these matters because if there has been a little money left over it has been taken by the organizations in increased wages about as fast as it has appeared."

Mr. Higgins said that the argument that one road pays higher rates than another in its territory is continually used to bring up the wages on the road that has the lower rates, although different rules on different railroads may result in even greater compensation to the men with the lower rates; and these rules are continued in the schedules in spite of changed conditions, because of the saving clause in arbitration agreements, no matter what the board decides. It had been the intention of the roads in this case, he said, to get before the board some rules of this character with a view to standardization, but the saving clause prevented this, and as a result, any higher rates or more favorable rules that might be awarded would be superimposed on the "high spots" of the present schedules.

Superintendents, he said, receive about \$250 a month, and the Missouri Pacific has one engine run which for a 31-day month would pay \$328. The engineer, however, works only 20 days, because the other men will not permit him to work the full month. Only two division superintendents on the road receive more than this. The run referred to is a motor car run from Madison, Kan., to Butler, Mo., leaving Madison at 6:30 a. m., arriving at Butler at 11:25 a. m., leaving Butler again at 1:30 p. m. and arriving at Madison at 6:30 p. m. Roundhouse foremen of the Missouri Pacific, he said, receive from \$100 to \$135 a month; train dispatchers from \$110 to \$150, most of them between \$135 and \$150, for about nine hours' work; chief dispatchers receive \$165 to \$170 a month, and work from 10 to 16 hours a day; master mechanics receive from \$183 to \$220, and are responsible and liable to be called upon at all times.

"My position," said Mr. Higgins, in reply to a question by the chairman, "is not that the engineers are getting too much for the work they perform, but that certain engineers, under certain rules, are getting more than they are entitled to; if the rules were standardized and under those rules the same earnings were produced, measuring the service fairly, I would not find fault. But leaving out the question of inequitable rules, the engineers and firemen, considering their responsibilities, are going ahead entirely too fast by comparison with other classes of employees, considering their responsibilities. I am not in favor of a reduction in pay, but the rates are high enough and many rules are inequitable."

Mr. Nagel asked if it would be safe or wise to continue to build upon the basis which has thus far been accepted in fixing rates of pay, considering the power of the engine, as well as the miles and hours. Mr. Higgins, in reply, said that the demand is not only built upon the previous basis, "but proposes to go further and segregate certain time that has always been included in the trip as a whole into arbitrary payments and additions."

On cross-examination Grand Chief Stone of the engineers tried to show that low rates in the early days were in proportion to the size and capacity of the engines in those days. Mr. Higgins thought that the size of the engine was not the governing factor. "I have put in some trips of 140 miles, taking 23 or 24 hours," he said, "and the engine was small, but that was not what was troubling the engineer and me. It was the number of hours. As a conductor on the Illinois Central I once handled a train from Chicago to Kankakee, consisting of 12 loaded cars and 90 empties, with one engine. It was no easier for that engine to haul its capacity than for the bigger engines now to haul their rated tonnage. We received lower rates of pay then and we worked harder and for longer hours."

Mr. Shea, one of the arbitrators, asked if the size of the engine did not have an effect on the revenues of the company. Mr. Higgins thought that the Illinois Central was paying bigger dividends than it does now. The Missouri Pacific has not paid a dollar in dividends since 1907, he said, but since that time it has increased its payroll by more than \$3,000,000 a year. In 1907 and 1910 the increases to engineers on the Missouri Pacific cost \$305,000 a year, an increase of 19 per cent. Firemen and hostlers got an increase of \$206,000 a year. During the same period conductors and brakemen secured an increase of \$530,000 a year, yardmen, \$246,000; telegraphers, \$214,000, and mechanical and shop forces \$573,000. These are all represented by organized labor, but the non-organized men received increases as well. Station agents, section foremen and laborers, bridge carpenters and other non-union employees, received an increase of \$444,000 in 1907 and \$493,000 more in 1910.

Speaking of the demands for time and a half for overtime, Mr. Higgins said the situation in railroad service is not comparable with that in the industrial field. "The engineer is guaranteed a minimum day," he said, "which the industrial worker is not. The engineer is assured more than a minimum day, without reference to the measure of time, on runs over 100 miles, and often he makes several days' pay in one. The industrial worker has no guarantee of a minimum day and cannot make more than a day's pay without working outside of his regular hours. The industrial employer absolutely controls the overtime, for he can put work off until the next day, and if he does pay overtime he can put the cost into his prices. The railway on the contrary is not so protected; at the end of the 10 hours the engineer in yard service, for instance, may be in the most important work of the day, as making up a train for passengers or perishable freight, which must be completed and may be completed in one or two hours. Under the proposed rules this would be at penalty rates and the only remedy would be elimination of the guaranteed minimum day, making it possible to relieve the regular man and use an extra man who would be paid only for the hours he worked."

THE HOSTLER AND HIS DUTIES

H. Clewer, supervisor of locomotive operation of the Rock Island Lines, continued his testimony before the board on February 9, dwelling principally on the effect of the rule asked by the engineers and firemen requiring the employment of hostlers at certain points, fixing their rates of pay and providing that hostlers shall be recruited from the ranks of the firemen. Mr. Clewer testified that the latter rule would close the avenue of promotion to many men who are giving efficient service, but whose training is different from that of the fireman. He described in detail the work of the hostlers at various points on the Rock Island Lines, showing that the character of the work differs greatly at different points. In many cases there is so little

hostling work to do that men who spend most of their time at other work perform this service and many men may qualify for the position of hostler or hostler's helper after a short roundhouse experience, without ever having been firemen. He also said it was a common practice to employ as hostlers men who have been in the engine service but who have become incapacitated.

Vice-President W. L. Park, of the Illinois Central, one of the arbitrators, asked President Carter, of the firemen's brotherhood, if he represented the hostlers by a vote of the hostlers themselves.

"No," replied Mr. Carter, "but we have been petitioned by a number of them to represent them and if every word of our proposition is included in the award of this board it will not disturb any man at any point who is now filling the position of hostler."

"No," said Mr. Park, "but it will close the door hereafter to those men absolutely."

"It might close the door to the man who is coming in on the next ship," said Mr. Carter. "It might say to those people who are coming here after this war is over: 'Hereafter you will have to fire an engine before you can hostle one.'"

Mr. Carter said that, if the railroads will agree, the men who are now helping the hostlers will be included in the next wage movement. He took the position that it is necessary for a man to fire an engine in order to be competent to be a hostler, but he admitted that he would consider that men now employed who have been hostling for some time should be competent. Generally, he said, the men who are working in the pits around roundhouses or wiping are "the latest importations, men who usually cannot speak the language."

"As I understand it," remarked Mr. Byram, "the question of the competency of a hostler is now determined by the railroad company's officers."

"I am sorry to say, yes," said Mr. Carter.

"You do not think the officers of the company are competent to select competent men for these places?"

"I will not say they are not competent, but they would rather have an incompetent man at 17 cents an hour than a competent man at 30 cents an hour."

"But it is your contention," said Mr. Sheean, "that these men now in these positions who have been recruited in the way that you object to, should have their compensation increased?"

"Yes, sir."

"Is it your idea that the men, wherever they are recruited from, will be more efficient by a change in compensation?"

"Invariably so," said Mr. Carter, "because when the railroads have to pay for efficient men they will hire no others. That is, I am sorry to say, the policy of getting the most efficient work out of the men for the money."

Mr. Nagel asked, "Have we not here another case where men are looking around for a pair of suspenders to lift themselves out of a job with?"

OIL-BURNING LOCOMOTIVES AND AUTOMATIC STOKERS

Mr. Clewer also described in detail the operation of an oil-burning locomotive and the duties of a fireman on such a locomotive. "Practically no manual labor is connected with his duties," said Mr. Clewer. "All of his manual work together consumes only about 10 per cent of his time. His principal work is to regulate the atomizer spraying oil into the firebox, and to control the amount of oil by means of the regulator handle. This operation is performed while he is sitting on the seat box. It is necessary occasionally to use sand to clean the soot out of the flues."

A. N. Willsie, chairman of the fuel committee of the Chicago, Burlington & Quincy, explained to the board how the mechanical stoker has lightened the firemen's work on a large number of locomotives. "If a movement of the hand to control the mechanical stoker may be called manual labor," he said, "the fireman is working 20 per cent of the time. The remaining 80 per cent he has nothing to do. If, in a run consuming 20 tons of coal, he scoops one ton by hand it would be excessive. His only duty is to see that there are no holes in the fire and that the

distributors do not become clogged. If a hole appears in the fire, admitting cold air through the grates, he must occasionally put coal on these spots with his scoop, seldom more than one or two scoops of coal. The heavy work and the hot work are almost entirely eliminated. The stoker is better than any two firemen and the engine can be worked to capacity hour after hour, and on some trips only a few hundred pounds of coal need be thrown on by hand."

COST OF LIVING AND WAGES

Ray Vance, an economist of St. Louis, testified on Monday, February 15, in connection with an exhibit comparing increases in the cost of living with increases in wages to the western engineers and firemen, and wages in other skilled occupations. He showed that the increase in pay received by the railway men has been almost double the increase received by bricklayers, carpenters, painters, plasterers and plumbers in the building trades, and machinists and moulders in the metal trades.

"In the western territory," said Mr. Vance, "the average daily pay of enginemen increased 11.3 per cent, and of firemen 11.4 per cent from 1910 to 1913. The average weekly rates in six of the seven trades increased less than 5 per cent and in the other trade, that of painters, only 7 per cent. That is, the pay of western engineers and firemen grew in greater ratio than did that in the seven other skilled trades. Against the increase of 11.3 per cent and 11.4 per cent in the wages of engineers and firemen the average expenditure for food and rent in this western territory increased only 9.3 per cent.

"The annual compensation of bricklayers in the west in 1913 averaged \$1,259; carpenters, \$1,001; painters, \$994; plasterers, \$1,268; plumbers, \$1,335; machinists, \$963, and molders, \$979." Against these earnings engineers in passenger service were shown in the month investigated to have earned an average of almost \$184 while firemen in the same service earned an average of \$115.53.

Mr. Vance went on to show that unemployment in the railway service was far below that in the building trades. "In the building trades," he said, "unemployment in the western territory is 10.1 per cent, while for the 4 classes of railway trainmen it is only 4.3 per cent. In both east and west unemployment in the building trades is from two to three times as high as for the several classes of railway trainmen.

"Although wages in the west generally are higher than in the east, the cost of food, rent, fuel and light, which absorb two-thirds of the annual expenditure of the working man, is slightly less in the west than in the east."

S. E. Cotter, general superintendent of the Wabash, presented a statement by E. B. Pryor, receiver of the Wabash, showing how the proposed rates and rules would affect this road, which, while competing with eastern lines, is forced to pay engineers and firemen the higher western scale of wages as far east as Detroit and Toledo.

"On Mikado type engines," said he, "we have to pay engineers

\$5.30 and firemen \$3.75 a day. Our competitors, one running partly over the same rails as we, pay only \$5 and \$3.30, though some of them earn over twice as much gross per mile. If the west is raised still further the difficulty will be increased."

Mr. Carter sought to show that the Wabash should pay this higher rate.

"But wasn't your own position in the eastern arbitration," asked Mr. Byram, "that eastern wages should be as high as western?"

"We asked that they equal the western average," replied Mr. Carter.

"Yet if your requests now are granted, the west will be still further above the east?"

"Yes, that is true," replied Mr. Carter.

A. W. Trenholm, general manager of the Chicago, St. Paul, Minneapolis & Omaha, and chairman of the Conference Committee of Managers, took the stand Tuesday and described the effect of each of the enginemen's demands on operating conditions.

A HIGH SPEED RECORD

Some of the Western plains are intensely uninteresting from the point of view of the tourist in the observation car. This we have on the authority of a passenger-traffic manager who, once on a time, had a sudden accession of candor, and stated the fact in one of his advertisements. But not all Western plains are in this class, and we present herewith a view of one which is of the opposite kind. This is a bed of salt, on the line of the Western Pacific. The picture was taken on the occasion of an automobile speed test. The scene is at Salduro, Utah, 112 miles west of Salt Lake City. The view is looking north. The racing automobiles are seen at the left of the picture. These are not extremely distinct; but the picture is printed more for the purpose of showing the novel landscape.

The automobile run was made by Teddy Tetzlaff on August 12, last, and the best time for one mile was 25.2 seconds, which is equal to 142.85 miles an hour, a trifle better than the best preceding record, which was made on the beach at Daytona, Fla., in April, 1911. This is the highest speed ever traveled by man on the face of the earth.

The best speed ever made by a vehicle running on rails was that recorded in the Berlin-Zossen tests of electric cars, in 1903, when a rate of 130.5 miles an hour was made, on October 27.

The crystallized salt in this Utah bed makes a hard and absolutely level surface, and it is said that even in the hottest weather it does not heat the tires of automobiles. The salt beds are 65 miles long and 8 miles wide. The estimated depth, in the middle, is 12 ft. to 15 ft. The salt is white, and averages 98 per cent pure. Tetzlaff says that with more preparation he can make still better speed. In racing over the salt beds the motorist has an unusual feeling of security because of the entire absence of obstructions



Scene on the Western Pacific at Salduro, Utah

RAILROADS' APPEAL TO NEW JERSEY AND PENNSYLVANIA VOTERS

R. L. O'Donnel, chairman of the special committee of the railroads of Pennsylvania and New Jersey, pursuant to the announcement issued last week, has sent to the newspapers and a large number of individual citizens an eight page pamphlet containing the principal arguments in favor of repealing the extra-crew laws of those states; and he will follow this with another containing editorial expressions from prominent newspapers in different parts of the country. Twenty roads are now members of Mr. O'Donnel's committee. Following are the salient points of the circular:

THE MAIN POINTS

First of all, let it be distinctly understood that the railroads make no war upon their trainmen. This move is not to deprive of a job any man for whom there is real work or a legitimate position. It is made to uphold the larger interests of the whole body of railroad employees, and the far greater interest of the public. For more than three years a full-crew law has been in effect in Pennsylvania and for nearly two years in New Jersey. The avowed objects for which they were enacted have not been realized. They have arbitrarily put on thousands of passenger and freight trains extra men for whose presence there is no need. They have created employment without real service going with it, and have worked violence to economic laws and forced waste into railroad operation. They have added to the expense of railroad operation in Pennsylvania and New Jersey more than \$2,000,000 a year. These laws have added a burden to the public which the people are not fairly called upon to stand. They have put organized labor in the false and untenable position of demanding employment by edict of law.

FALSE CLAIMS

It is claimed that they make for safe railroad operation; but the railroad companies, their managers and their security-holders have very direct interest in safety. They stand for safety because humanity demands; also as a plain business proposition. Accidents and wrecks are costly as well as fatal.

Property rights fall secondary to human rights. In that contention the trainmen's organizations which forced through the full-crew laws and which now fight, in error, as we believe, to continue them, stand exactly where we do. The railroads will give ready and hearty support to all measures really protective of the persons and property of all those who use railroad service. But where human rights are properly recognized and safeguarded, it becomes an abuse of property rights, and does violence to economic laws, to force the railroads and so the public to carry the load of thousands of men whose employment the present laws require regardless of necessity.

NO GOOD RESULTS

These laws have not increased safety. They have divided responsibility by forcing extra men into train crews. This works against rather than for safety and efficiency in railroad operation. Statistics and actual results prove that this is the case.

We agree that far too many are killed and injured on the railroads. We also frankly admit that in the past railroads have been too slow in introducing safety devices, partly owing to the costs involved, but largely because of a stupid and stubborn attitude of mind, once too prevalent among railroad managers. In many cases they did what was obviously right, and as results amply demonstrated to the advantage of railroads, their employees and the public, only under compulsion of public opinion and enforcing laws. Railroad managers as a body have reached a more enlightened state of mind. They are ready not only to listen to the public, but to trust the people to decide upon the merits of any proposition in which the public is a third party, where railroad managers find their judgment and conclusions controverted by employees or by laws which work badly and unjustly.

[The committee here quotes statistics showing that there has

been no decrease in the number of persons killed and injured since the adoption of these laws, and quotes also the decision of the Connecticut commission (*Railway Age Gazette*, December 18, page 1118) condemning the extra-crew bill proposed in that state.]

NORMAL OPERATION

The railroads intend to man every train—passenger and freight—to the requirements of safety and operating efficiency. Their contention is merely that the right number of men cannot be fixed arbitrarily and without regard to the service to be performed by each train. Under the laws there is no latitude, and operating conditions constantly arise which make it necessary to delay traffic or inconvenience the public, or else violate the law. There is less and less, rather than more work for trainmen. Hand braking is virtually a thing of the past, except in yard shifting. Freight, as well as passenger trains, are now operated with air brakes applied to every car, except in cases of emergency defects. Mechanical interlocking has greatly reduced switching duties of trainmen. Automatic signals have also made work safer for trainmen.

EFFECTS OF THE LAW

In effect the law works as follows:

A twenty-nine-car freight train can be lawfully operated with a crew of five men. Add a car, and an extra man must be put on. The law requires no larger crew on one-hundred-car trains. A four-car passenger train can run with a crew of five men. On a five-car train there must be a crew of six men. Even if all the cars are Pullmans, with porters and a Pullman conductor, a six-man railroad crew is required. A milk train of twenty or more cars, running through virtually without stops, must carry a crew of six. The only place four of them would ride would be in the caboose.

When the Pennsylvania full-crew law became effective, the Pennsylvania Railroad was operating in the state of Pennsylvania, week days, trains as follows: 609 through passenger, 990 local passenger, 863 through freight, 234 local freight, 275 road shifting freight—a total of 2,971 trains

Of these 2,971 trains, 2,205 were manned up to or in excess of what the law required. Of the passenger trains 1,198, or 74.9 per cent, were so manned. The trainmen's organization lays particular stress upon the need of the extra man on freight trains. Of 1,372 such trains, 1,061, or 77.3 per cent, of the total were manned by the company up to or beyond what the law required.

Of the 401 passenger trains affected by the act, 353 were through trains, composed largely of Pullman, express, mail and baggage cars, making few stops, and often no stops throughout division runs. Forty-eight were local trains, handling a comparatively small number of passengers. On through trains, the Pullman cars were in charge of Pullman conductors and porters, while mail and express cars were in charge of messengers, all in addition to the regular train crews.

Of the 311 freight trains on which an additional brakeman was added by the law, 118 were preference freight trains, averaging about forty cars each, running on assigned schedules and making no stops between division terminals to do any work, except in case of emergency. The other 193 trains ran over divisions and had some shifting to do at intermediate points. These trains handled on some divisions an average of about fifty cars and on other divisions from thirty-five to forty-five cars.

The 1,198 passenger trains which were provided with crews equal to or in excess of the law's requirements consisted principally of local or semi-local trains, making frequent stops and handling a large number of passengers. The second brakeman was employed to expedite the departure of trains from stations and to assist the conductor in collecting tickets.

The 1,061 freight trains on which the law required no additional men consisted of local freight trains, carrying package freight, on which brakemen were required to load and unload cars; road shifters, doing a large amount of work, necessitating the throwing of switches and much hand-braking on cars; mine

trains, placing empty cars and picking up loaded cars, and through slow freight trains of heavy tonnage on the Philadelphia and Middle divisions on which the brakeman riding on the front part of the train was required to assist the fireman.

The railroads seek only that which they are convinced to be right. They expect that the trainmen's organization will impugn the motives actuating this campaign. They anticipate that an effort will be made to deceive railroad employees into a belief that the companies' ulterior purpose is to cut down forces in unwarranted manner and in ways to impose hardship upon trainmen. They also look for an attempt to convince the public that in this effort the railroads make covert attack upon safety and efficiency in operation. None of these allegations, if made, will be justified. The railroads frankly recognize that if these laws, avowedly made to protect railroad trainmen and the public against possible abuses shall be repealed, as the larger interests of all require, justice equally demands that some authority above the railroads shall stand by to make certain that trains are manned adequately. [Here is quoted the pledge given out last week.]

NO ATTACK MADE ON LABOR

In their present action the railroads make no attack upon organized labor, but upon a mistake it has made. Labor cannot successfully defend any proposition in defiance of economic law. Organized labor in this instance is doing itself and its membership, also the railroads and the public, a wrong and an injustice. Upon such a proposition labor must ultimately yield to laws stronger and higher than any legislature can enact, but not successfully enforce. Labor does not want to load itself with the burden of men employed without need. Working men should repudiate indefensible acts by labor unions. In doing so they will gain.

It is frankly recognized that railroad employees have a right to organize. Further, let trainmen and the public clearly understand that we believe it to be as impossible for the individual employee in a great transportation system to be certain of fair treatment, acting by himself, as we know it would be impossible for one man to provide the capital necessary for creation of the huge Pennsylvania Railroad system.

Let no one think this is a fight of railroad managers. It is essentially a fight for the public. Railroad officers are merely salaried men. Their duties and responsibilities are those of stewards—to give conscientious service in the conduct of the properties in their charge.

This implies, first, the best they can do in providing transportation and service to the public, an essential of which is liberal and even treatment of the whole body of railroad employees. Their ability to perform this highest duty—which is to the public and employees—is curtailed by the full-crew laws. The other chief responsibility of railroad managers is to the host of people—men and women—who, directly, or indirectly, as depositors in banks, trust companies and savings funds, are investors in railroad bonds and stocks. . . . With \$2,000,000 a year, now wasted in employment of men whose services add nothing to the safety or efficiency of railroad operation, more steel passenger cars could be bought, new stations could be built, block signal systems could be extended, additional freight terminal facilities could be provided, more grade crossings could be abolished. All this would make much work for labor generally. It would help the steel industry, the cement and building trades, give work to electrical concerns, to contractors, to skilled workmen and mechanics, to day laborers.

FATE OF FULL-CREW LAWS

The full-crew bills have been defeated in many states. Full-crew laws have not always survived. The court of public opinion, when it has been appealed to for a decision, has decided emphatically against the idea. [Here the committee tells of the recent referendum vote in Missouri and quotes from the veto message of the governors of New York, Massachusetts and Oklahoma.]

Attempts to get full-crew laws in Colorado, Delaware, Vir-

ginia and Ohio also failed. Thus in nine states there has been failure, and in another a law enacted was figuratively torn up by the people. In the east full-crew laws are in effect in Pennsylvania, New Jersey and New York, while in Maryland there is a full-crew law as to freight trains only.

These laws should be repealed in the interest of the public, the railroads and the great body of railroad employees. Figures show that all the railroads operating in Pennsylvania are now employing about 2,500 extra brakemen. There are in all some 65,000 men employed in train service in the state.

Much of what the trainmen's organization did last year in Missouri to keep a full-crew law on the statute books of that state, the railroads operating in Pennsylvania and New Jersey will now do in these states to bring about repeal of like laws. It is to be an open, square and above-board direct appeal to the intelligence and judgment of the people. The railroads will conduct the campaign in every legitimate way. They will publicly stand for what is done and said. There is to be no lobby; neither will there be any star chamber conferences or private deals to influence either public opinion or legislative votes.

The methods by which the public can impose its will in Pennsylvania and New Jersey are not as immediately final as was the referendum vote taken last year in Missouri. But without this the railroads now go to the people of Pennsylvania and New Jersey to present a case in which the public interest is directly involved. This is done with a firm conviction that upon presentation of the question the public will decide what is right and that a ground swell of expressed opinion from the people of these states will be recognized and acquiesced in by their elected representatives at Harrisburg and Trenton. The case being put before the people, the power rests with them to enforce such decision as the court of public opinion shall render.

SUSPENSIONS SUSPENDED ON THE B. R. & P.

The Buffalo, Rochester & Pittsburgh has made an interesting trial of discipline without suspension. It is only a cautious and partial adoption of the system, but the experiment has been kept up for over two years and further progress may confidently be looked for. An officer of the road writes us as follows:

"Recognizing that the purpose of discipline should be the education and desirable development of employees, and that disadvantages accrue, not only to the individual employee, but to the company when discipline is enforced solely by actual suspension, the management on October 1, 1912, put in effect a plan which provided that discipline be decided on in the same manner as before; that is, by a "court" presided over by the superintendent, or his representative; but that its application would be withheld unless there should be cause for further discipline within a prescribed period of probation. For example, a man who has committed some fault which the "court" decides should be visited with a suspension of ten days or less, is put on probation for six months; a decree of suspension of over ten days and less than thirty days, makes the period of probation nine months, and a decree of suspension of thirty days or over, calls for a period of probation of one year. But should the employee get into trouble during his period of probation, he must at once serve the suspended sentence which the court found him liable for; and a new period of probation is started.

"That this plan has been of material benefit is evident from the fact that during the two years to October 1, 1914, but 25 per cent of the sentences imposed on train and enginemen were put into effect. These caused a loss of time equivalent to only 32 per cent of the time covered by the total number of sentences, or one-fourth of 1 per cent of the total employee-days involved. The total number of sentences put into effect without allowing the delinquent employee the opportunity afforded by the designated probation period, was approximately 2 per cent of the whole. These sentences, also the days served, are included in the 25 per cent of sentences and 32 per cent of time served. But a very small percentage of long term sentences were served."

Maintenance of Way Section

THE Maintenance of Way Section for March will appear in the issue of March 12, instead of in the third issue of the month. This is because the convention of the American Railway Engineering Association comes the following week, during which time we will, as usual, publish four daily issues, which will be sent to all subscribers to the maintenance of way edition.

The reconstruction of almost every bridge under traffic presents a special problem requiring the development of methods adapted to the particular location and conditions. The consequence is the use of a wide variety of methods in handling work of this class. The particular conditions may require the adoption of special methods for solving either the entire problem or certain parts of it. In general, the manner in which these conditions are met is known only to those connected with the work and other men confronted with similar difficulties do not secure the benefit of their experience. We have therefore announced a contest on Bridge Construction Methods to include descriptions of methods new or not generally known for handling special problems involved in the reconstruction of bridges and their substructures, the purpose being to bring such methods to the general attention of bridge engineers. To stimulate interest we have offered prizes of \$25 and \$15 for the two best papers submitted, and will pay our space rates for all other papers accepted and published, the prize awards to be based on the originality and practical value of the ideas presented. All papers to be considered must be sent to the Engineering Editor of the *Railway Age Gazette*, 608 South Dearborn street, Chicago, and be received not later than March 10.

Both Mr. Bowser and Mr. Schott call attention in articles in this issue to one point of contact between the public and the railroads which has not been cultivated to the greatest extent by the roads. The section foreman comes into more or less intimate contact with the farmers along the line in the relation of a neighbor in the handling

of such details of common interest as the repair and maintenance of fences, farm and highway crossings, open ditches, etc. By his attention to these details he can do much to gain the good will of the farmer for himself and for his road which will extend to other farmers in the community as well. The cultivation of this spirit is of advantage to the railway in several ways. In the first place, it is a material aid in the creation of a favorable public sentiment, which is an important factor in the relations of the railroad with the rural communities. Such a sentiment is also an important factor in the routing of traffic. The efforts of the agent to secure the shipments of live stock and other agricultural products will amount to little at any competitive point if the farmers are antagonistic to his road. Another direct return results in the securing of the co-operation of the farmers in the prevention of the causes for stock, overflow and other claims. A large part of these claims is preventable, but if a feeling is allowed to develop that "the road will pay for it," claims will provide a considerable source of revenue for the farmers and will show a strong tendency to increase, while at the same time a spirit of hostility is created. Being a resident of the community, the section foreman and his workmen can do more to secure for his road the good will of the rural residents, and operators of small industries as well, than can the superintendent, traffic solicitor,

or claim agent from the distant terminal. In these days of so much unfair agitation it is worth while for the supervisors of track and higher officers to impress upon their foremen the importance of equitable relations with the public.

Trackmen will watch with interest the results secured with the 70-in. tie plates which the Pennsylvania is now using under the joints of its 100-lb. rail, as described on another page. Such a tie plate is a distinct innovation, and in addition to retarding rail creeping by extending over four ties it should give a stronger joint and

better riding track. The increased support should also materially decrease the battering of the rail, and thereby increase its life, for it has been common experience during recent years that it is necessary to remove much rail from main tracks before it is worn out, because of battered joints. This latter condition is becoming increasingly expensive. A few years ago conditions on many roads were such that battered rail could be used to good advantage on branch lines after sawing off the ends. On many roads, however, branch lines are now completely relaid with rail sufficiently heavy for the traffic, and it is desirable to secure the full life of the rail before removing it from the main line. On some roads main line rail is being removed, taken to a central point, the battered ends sawed off and the rail then returned for relaying in main lines. To avoid this heavy expense at least one prominent road is endeavoring to devise a machine which will saw the ends from these rails without their removal from the track, with the intention of driving the rails together until there is sufficient space to drop a new rail in. Any means which will reduce the battering of rail at the joints and thereby increase its life deserves serious consideration.

THE MARCH CONVENTION AND EXHIBIT

WITH each succeeding year the convention of the American Railway Engineering Association becomes more representative of the development of the railway engineering of the country. From its inception in the offices of the *Railway Age* in Chicago in October, 1897, this association has grown until it now has over 1,200 members, representing 90 per cent of the railway mileage of the United States and Canada. It is not surprising, therefore, that its proceedings and recommendations carry a weight second to those of no other association without official relation to the roads.

The convention this year should be one of the best in the association's history. Because of the general inactivity in railway construction the committees have been able to spend more time in the preparation of their reports, while because of the small amount of work under way more engineers will be able to attend the convention than usual. While the association's conventions are considered as being primarily for the higher engineering officers, the younger men can attend its sessions very profitably, for a great deal of information is presented in which they are vitally interested.

Hardly secondary to the sessions of the convention is the annual exhibit of the National Railway Appliances Association at the Coliseum. While the exhibit is arranged primarily for selling purposes, the assembling of such a large amount of construction and maintenance of way equipment in a compact space makes the exhibit of great instructional value. The exhibit this year will be even more accessible than in previous years, as it is all consolidated on the main floor of the Coliseum. No engineer can afford to attend the convention without visiting

the exhibit, for it is important that he be informed regarding new devices and developments in old devices as well as in the theory of his profession. No better commentary on the value of this exhibit to practical men can be afforded than the large number of roadmasters and track foremen who annually visit it and study the exhibits in detail. Many of these men from nearby points come of their own accord, while a number of the roads have found the exhibit of sufficient value to their men to send them to visit it.

COMPARING MAINTENANCE EXPENDITURES

IN common with the experience in other departments of railway work, maintenance expenditures have shown a continual tendency to increase during recent years and the end does not yet appear to be in sight. The expenditures for maintenance of way and structures per mile of road for all roads in the country, as reported to the Interstate Commerce Commission, have risen over 65 per cent in the last 15 years, while a comparison of the average expenditures of 53 representative roads for the last two five-year periods shows an increase of 14 per cent in spite of the efforts to retrench. The maintenance of way officers must necessarily be able to explain to their higher officers these increases on their own lines and justify the standards to which they are working. It is not difficult to show causes for the increased expenditures—the increased unit costs of labor and materials, the heavier traffic requiring more work, etc.

It is more difficult to justify a standard. One manner of doing this is by comparison with other roads. However, this must be done very cautiously and with a full knowledge of the conditions. To show what a blind comparison on the basis of expenditures per mile of road will lead to one can secure figures which vary from \$5,000 on the Pennsylvania to less than \$800 on a few western branch line roads. Such figures make no allowance for the amount of traffic handled or the number of multiple main tracks. A more significant figure is that showing the percentage of gross earnings expended for maintenance of way, but this figure again varies from 8 per cent on an eastern road with a heavy freight business and relatively little passenger traffic to 23 per cent on one road with a very light business. However, the great majority of roads spend from 11 to 15 per cent of their gross earnings for maintenance of way, and the 10-year average of 52 representative roads is 13.3 per cent. But even when comparisons are made on this basis they must be made with great caution, for almost anything may be proved, if allowances are made for differences in conditions on the roads compared. For his own information the officer in charge of maintenance of way should compare his expenditures with those on other roads with which his lines are fairly comparable, but he must be exceedingly careful not to mislead himself.

THE PREVENTION OF WATER WASTE

ONE of the most difficult problems with which the railway officer is contending continually is that of preventing wastes. Mr. Brandeis told nothing to railway men that they did not already know when he made his famous statement regarding the opportunities for economies in the transportation business; for railway men have been working on this problem ever since the railway was invented. But the widespread publicity given to the subject of efficiency has served to focus attention on it more directly than ever before.

At first thought there might appear to be no opportunity for making savings of any consequence by a reduction in water consumption. The cost of five to ten cents per 1,000 gallons appears so small that even if the amount of water used were excessive its aggregate cost would generally be considered small. But a recent investigation on one road has shown an estimated possible annual saving in this one item alone of \$10,000 at two terminals. Another road on which a campaign has been made along this line for over a year is now effecting a reduction in

the cost of its water supply of over \$2,500 monthly as compared with a year ago, after making full allowance for the decrease in traffic. At one terminal where the water was purchased from the city and paid for by meter measurement the bill has been reduced \$800 a month. At another terminal the average monthly reduction for the past six months has been \$550. In general, it has been found possible to reduce the cost of the water used 20 per cent at terminals to which attention has been directed.

This condition arises from a number of causes. At one place it was found that city water purchased at a relatively high rate was being used for cooling an air compressor and other shop purposes, whereas the ordinary water pumped by the railway at its own plant and supplied to locomotives would do equally well and could be furnished at less than half the cost. Leaking pipes and flush boxes and the careless use of hydrants are other common sources of waste. When it is figured that a $\frac{3}{4}$ -in. orifice will discharge 6,000 gallons per hour under ordinary city pressure the importance of small leaks is evident.

In the elimination of water waste it is very necessary to secure the co-operation of all departments concerned. If, for instance, an attempt is made to reduce waste about shops, the mechanical department is very apt to defend this upon departmental grounds unless the problem is presented in the proper manner. The same is true of other departments. If the matter is properly presented to the officers in these departments, they can then co-operate in extending the proper supervision. The savings mentioned above form only a small part of those possible when such a campaign becomes effective over an entire system, and the question of water waste is only one of numerous so-called minor opportunities for effecting savings which will reach large amounts in the aggregate.

NEW BOOKS

Resistance of Materials. By S. E. Slocum, professor of applied mathematics, University of Cincinnati. Size 6 in. by 9 in., 250 pages, 152 illustrations, 17 tables. Bound in cloth. Published by Ginn & Company, Boston, Mass. Price \$2.

This is a text book on applied mechanics which eliminates calculus in the solution of the problems to which it is usually applied in such books. The author mentions as advantages of this treatment that the subject can be taught at the same time or preceding the study of calculus in universities and can be used in trade schools where calculus is not taught. It also has the advantage of fixing firmly in a student's mind the principle of moments which is used repeatedly in place of calculus methods. This feature of the book will also make it of value to those practicing engineers who find that after a number of years have separated them from their college training it becomes increasingly difficult to use higher mathematics in the solution of their problems. The volume covers stress and deformation, moments, strength of beams, columns and struts, torsion, strength of spheres and cylinders, flat plates, riveted joints and connections, reinforced concrete, and simple structures. The tables cover properties of materials and mathematical functions sufficient for a student of this subject. The problems included in the book are noteworthy for their direct application to engineering subjects which should make them of practical value.

The Theory and Design of Structures, and Further Problems in the Theory and Design of Structures. By Ewart S. Andrews, lecturer in theory and design of structures at the Goldsmith's College, New Cross, England. Size 6 in. by 9 in., 618 pages and 236 pages, respectively, illustrated, bound in cloth. Published by the D. Van Nostrand Company, 25 Park Place, New York. Price \$3.50 and \$2.50, respectively.

Andrew's Theory and Design of Structures was first published in 1908. It is distinctively an English text book using graphical methods in many instances, but avoiding mere graphical artifices for making calculations. The third edition, which has just been published, has been revised and corrected and an appendix added to include some additional matter, most important of which is a description of Stanton's experiments on wind pressure.

As the author considered the treatment of the elements of design and the discussion of framed structures, columns, suspension bridges and arches, masonry structures, reinforced concrete structures, steel work for buildings, roofs, bridges and girders sufficient for average readers, it was decided to prepare an additional volume covering recent developments in structural design, the most important of which are the use of influence lines and the method of internal work. The second volume also includes discussions of stresses in redundant frames, in rigid or elastic arches, in portals and wind bracing, and secondary stresses in structures. In both volumes an attempt has been made to give practically all of the steps in mathematical deductions to avoid the difficulty frequently found in supplying the missing steps.

Structural Engineers' Handbook. By Milo S. Ketchum, dean of the college of engineering, University of Colorado. Size 6 in. by 9 in., 896 pages, illustrated, bound in flexible leather. Published by the McGraw-Hill Book Company, New York. Price \$5.

A large majority of the books on the design and construction of bridges and buildings are prepared primarily for students or are intended to present predigested data that can be safely used by non-technical men. This new book by Milo S. Ketchum, however, is not a text for classroom use and the tables are not arranged for application by non-technical men. The elimination of the elements of design, necessary in a work intended for students, allows the full space of the somewhat bulky volume to be filled with a wide variety of data bearing on the design and erection of steel bridges and buildings, retaining walls, abutments and piers, timber bridges and trestles, steel bins, grain elevators, head frames, coal tipples, standpipes and elevated tanks. Chapters are also included covering structural drafting, estimates of structural steel, erection of structural steel, engineering materials, structural mechanics and the design of steel details. The tables include the properties of sections, safe loads for angles, beams and channels, and of angle struts, properties of rivets and riveted joints and miscellaneous data for structural design. Trigonometric and logarithmic tables are not included. The typography is good and special care has been taken in the preparation of drawings and tables to make them easily readable. Dean Ketchum is also the author of a number of books on the design of structures, from which some material has been taken; but in general, the new handbook is intended to supplement such works rather than to replace them.

Structural Engineering. By J. E. Kirkham, professor of structural engineering, Iowa State College. Size 6 in. by 9 in., 669 pages, 452 illustrations, bound in cloth. Published by The Myron C. Clark Publishing Company, Chicago. Price \$5.

Kirkham's "Structural Engineering" is intended primarily for text-book use. It contains a considerable amount of elementary material, such as the chapter on Structural Drafting and three chapters on Fundamental Elements of Structural Mechanics; Theoretical Treatment of Beams and Theoretical Treatment of Columns. Four more chapters are then devoted to general subjects including: Rivets, Pins, Rollers and Shafting; Maximum Reactions, Shears and Bending Moments on Beams and Trusses and Stresses in Trusses; Graphic Statics, and Influence Lines. The last five chapters are devoted to design, covering I-beam and plate-girder spans, simple railroad bridges, simple highway bridges, bridges on curves, economic height and length of trusses and stresses in portals and the design of buildings. It should be stated, however, that the chapter on the Design of Simple Railroad Bridges occupies 338 pages and is divided into four parts, beam bridges, plate girders, viaducts and truss bridges. Under each of these types a complete analysis of the steps in design is made with plates to illustrate the necessary shop drawings. Original designs worked out by the author have been used throughout in preference to standard designs taken from actual practice. This gives a commendable uniformity to the plates and tends to simplify the work of following through the steps in design with reference to the typical plans shown.

Letters to the Editor

THE OPERATION OF HAND CARS

EAST LAS VEGAS, N. M.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In the issue of the *Railway Age Gazette* of January 22, page 148, the lower left-hand picture is presumably intended to show the correct arrangement of men on a hand-car. This photograph shows that it was made on a single-track railway, therefore it would appear to be incorrect, as a train may be expected from either direction. Also the disposition of two men between the handles is not conducive to the best results. One of the men should be on the front of the car, facing backwards, so that a train approaching from their rear may be seen at the earliest moment.

While undoubtedly the disposition as shown is to offset that shown in the right-hand picture, it is apt to mislead men who might see the picture into the belief that to be without a man facing the rear would be an approved action by reason of the precedent established in the approval of such a picture for "safety" purposes.

C. CLAY.

AN EARLY NARROW GAGE-STANDARD GAGE CROSSING

TOPEKA, KAN.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read with interest the articles published in your issues of Dec. 18 and Jan. 22, relative to the crossing of a standard gage by a narrow gage track. In 1907, when assistant engineer on second track construction for the Atchison, Topeka & Santa Fe, in Missouri, I installed such a crossing east of Elmer, to move steam shovel dirt trains from one side of the main line track to the other, and found its operation very satisfactory for such temporary work. It being necessary for me to use stock material, No. 9 frogs with 10-ft. switch points were employed, each switch point being operated independently from a switch stand, and one operator throwing all four points when changing the line up from one track to the other.

I am advised by a reliable source that as early as 1881, in the construction of the Leavenworth, Topeka & South Western, a similar device was employed by J. R. Ellinwood, a former chief engineer of the A. T. & S. F. He, of course, employed stub switches, as there were no switch points in use at that early date; however, the general arrangement was exactly the same as the above.

T. H. MCKIBBEN,

Engineer, Atchison, Topeka & Santa Fe.

COST OF THIRD RAIL MAINTENANCE

The cost of maintenance for 1913 of 20 miles of third rail in the Detroit and Windsor terminals was given as \$2,690 by J. C. Mock, electrical engineer of the Michigan Central, in an article in a recent issue of the *General Electric Review*. This figure, which includes supervision, amounts to \$134.50 per mile, or \$7.40 per day. One of the largest items entering into this was \$936 for the replacement of burned and broken insulators. Of the total number of burned insulators on the tunnel tracks 317 were in the eastbound tunnel and only 5 in the westbound. This difference is attributed to the fact that practically all refrigerated freight is eastbound and brine drippings from these cars fall on the third rail. The application of grease and roofing paper over these insulators has greatly reduced the trouble from burned insulators, although it has not entirely eliminated it.

CHILEAN RAILROAD CONSTRUCTION.—The construction of the railway line from Iquique to Pintados commenced about January 1. One thousand workmen are engaged on it.

Service Secured from Corrugated Iron Culverts

A Description of the Results Attained by Their Use Under Sliding Banks and in Other Unfavorable Locations

The corrugated pipe culverts manufactured from Armco-American ingot iron have been installed under widely varying conditions, in all parts of the country, and by a large number of railroads to carry minor waterways under the tracks. The mechanical advantage of the corrugated pipe in securing strength without great weight is evident, and in the culverts referred to this advantage has been combined with a material of so high a degree of purity that its resistance to corrosion is greatly increased. The properties of this material which make it more rust resistant than steel or the common forms of iron were discussed in the *Railway Age Gazette* of July 18, 1913, and September 30, 1910. These culverts have now been in service for a sufficient time to give evidence of their permanent qualities and a number of difficult problems have been solved by their installation.

Probably the greatest advantage of the ingot iron corrugated

crack which localizes the saturation. In these cases there is probably no subsequent movement. In other places large slides are found which in their action are analogous to glaciers, having a movement of 6 in. to 5 ft. per month and covering several acres. This tendency to slide was aggravated by the excavation of the cuts for the new line and also by loading the slopes with fills. Nearly all of the cuts are widened at grade to the river on the one side and in many cases the bank on the high side of the cut, even during the dry season, continues to move slowly, impelled by the slide behind it. The soil cracks off in slabs 5 ft. thick or so, the cracks extending in series back 50 ft. or more. During the rainy season this movement puddles the material and the slides may resemble runs of muck.

On the first 20 miles constructed the unimportant drainage was carried under the track in 24-in., 30-in. and 36-in. concrete pipe culverts with concrete headwalls. These culverts were

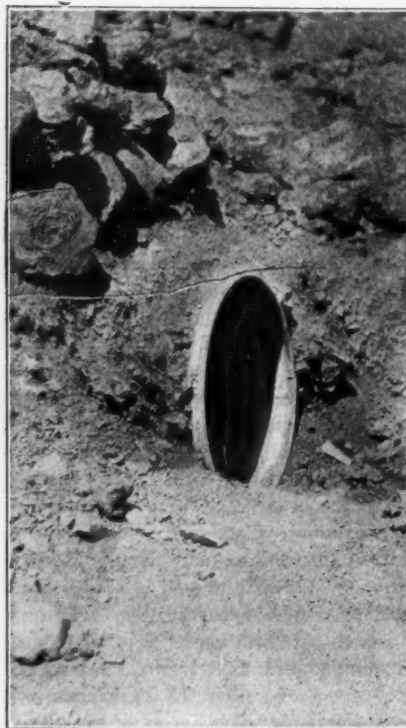


Fig. 1—A 24-in. Corrugated Iron Culvert Pipe Under an Earth Fill on the Northwestern Pacific



Fig. 2—A 24-in. Corrugated Iron Pipe Replacing a Failed Concrete Culvert

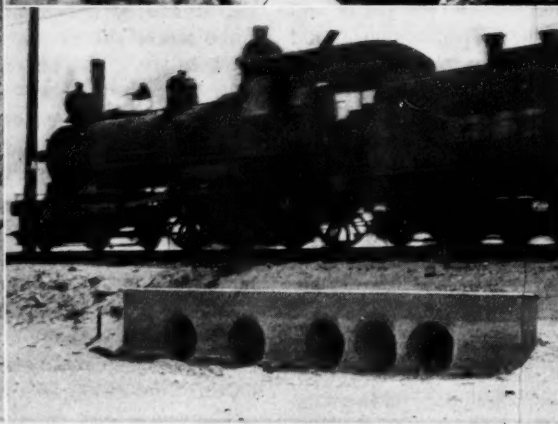


Fig. 3—Five Lines of 24-in. Corrugated Pipe on the Southern Pacific



Fig. 4—Failure of a Concrete Culvert under Shifting Load, Later replaced by a Corrugated Iron Pipe

culverts is the ability of these pipes to maintain a clear waterway under a settling or shifting embankment. One of the best possible examples of this conditions was furnished in the construction of the Northwestern Pacific between Eureka, Cal., and San Francisco, where for about 100 miles the line follows the Eel river at an elevation of 10 ft. or more above extreme high water. The formation is generally of a shaly nature or a decomposed serpentine, the strata pitching towards the river with a surface slope averaging about 30 deg. The shale is soft and friable, is slacked to a considerable extent by air and through decomposition forms the typical soil of the district, a tough clay. This clay bakes hard in the summer, but during the rainy season absorbs a large amount of water which often causes it to slide.

The country is covered with small slides forming broken terraces in certain localities which have been caused by excessive saturation of the soil, the water following some channel or

built in place without reinforcement, a form of construction commonly used, and which has been found to be inexpensive and very satisfactory under usual conditions. The foundations of the pipes were good locally, but due to the movement of large areas in which they were laid, many of these pipes broke, some failing entirely when the movement was not uniform throughout the foundation.

It was decided, therefore, that where the nature of the foundation appeared doubtful, corrugated iron culvert pipe would be used. If this pipe was moved down the hill by slides it was planned to remove the lowest joint and place it at the upper end. This has not yet been done in any case, but one 48-in. pipe has moved so far that at different times four 10-ft. lengths have been added to the upper end. Many other pipes have moved a smaller amount, although none have been more than two years.

The effect of these slides on concrete pipe is well illustrated by

three of the accompanying views. In Fig. 2 is shown the upper headwall of a concrete culvert and all that was left of a 24-in. concrete pipe which crushed due to the movement of the foundation. The lower end wall was carried down hill 6 ft. and had to be blasted out and used as riprap under the spill of a 24-in. corrugated pipe which was used to replace the concrete culvert. The upper end wall shown in the picture was chiseled out and the pipe inserted from back to face and concreted in place.

Fig. 4 shows part of a 4-ft. concrete arch with a 12-inch floor



Fig. 5—A 4-ft. Concrete Arch Culvert Destroyed by a Sliding Fill Which Moved It a Distance of 70 ft.

which had been built on a firm shale partially decomposed. It was broken in two places when the original ground under the fill settled. This culvert was replaced by a 36-in. corrugated iron pipe inserted in the end of the upper section of concrete pipe shown in the background of the picture, laid on the top of the second or middle section and on a back fill made in the third section after blasting off the top. In this case the move-

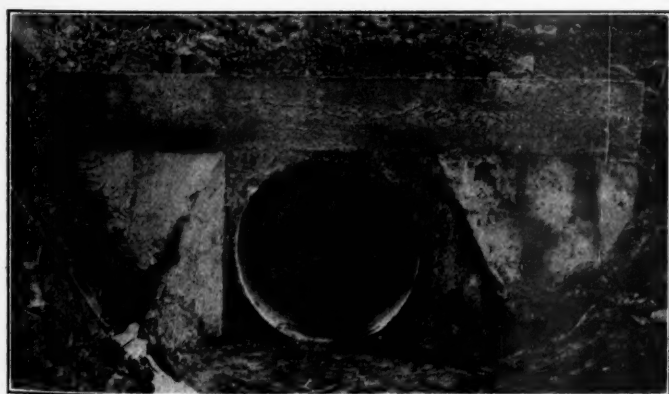


Fig. 6—A Corrugated Iron Culvert Laid Inside a Wooden Box on the Western Pacific

ment of the ground continued and the corrugated pipe was pulled apart at one joint a distance of 2 ft., this break being repaired by inserting a 10-ft. section of 30-in. pipe in the two ends. A case of a solid rock foundation failure is shown in Fig. 5, which is a 4-ft. arch built on a slight grade on solid shale. This fill was partially made during the fall and in the following winter slid out, carrying the arch toward the river about 70 ft.

Instances of corrugated iron culverts that have given satis-

factory service under shifting loads are also reported on the Minneapolis, St. Paul & Sault Ste. Marie and the Western Pacific. On the Soo, a culvert was installed near Superior, Wis., under an embankment composed of a material that decomposes rapidly and settles when exposed to the air. This pipe was not injured by a settlement of 6 ft. On the Western Pacific a number of corrugated iron culverts have been installed in locations where it has been difficult or impossible to maintain masonry on account of shifting foundations. One of these installations is shown in Fig. 6, where the pipe was laid inside a wooden box and back filled by ramming the material around the pipe. One or two installations of 60-in. culverts on this road made about 1½ years ago in locations where other culverts had failed repeatedly have proved entirely satisfactory up to date.

The stability of corrugated iron culverts under severe conditions has been demonstrated in many cases. In the earlier years of the use of this material and to some extent yet, the installation of corrugated pipe has been limited to low fills or other places of light service. This form of culvert is not absolutely invincible under all conditions and there are cases where large culverts made of 14-gage material have deflected under fills of 30 to 60 ft. of sand or gravel. One of the advantages of this material, however, is that for exceptionally severe installations it may readily be had in gages heavier than the standard. While a 14-gage is standard for a 36-in. culvert, a



Fig. 7—A Ten-gage, 60-in. Corrugated Iron Culvert under an 85-ft. Fill on the Western Pacific

Fig. 8—A 48-in. Corrugated Iron Culvert Pipe under a 15-ft. Rock Fill on the Northwestern Pacific

12-gage or even a 10-gage can be had at an added expense which represents merely the added cost of the iron.

There are many cases where corrugated culverts of the heavy gages, which should be employed for such installations, are giving good satisfaction under very heavy service. The Atlanta Terminal has one 12-in. pipe buried about 4 in. below the tie under a track which carries upwards of 200 movements a day. This installation was made five years ago and shows no signs of stress as yet. It is not recommended, however, that the pipes be installed with less than one foot of cover. An installation of a 60-in. 10-gage pipe under an 85-ft. fill on the Western Pacific is shown in Fig. 7.

Some of the Northwestern Pacific culverts have shown their ability to withstand a large amount of abrasion due to carrying debris including boulders. Fig. 9 shows some of the typical stones that are carried by the hundreds during the winter months through this 48-in. pipe on a 20-deg. slope. It is reported that in this and similar cases, the damage has been confined to the galvanizing. This is after two years of wear. The least grade that will carry this debris with certainty is a slope of about 1:5. Pipe laid level or on a flat grade will carry fine material such as gravel without choking, however. In this con-

nection, a considerable quantity of corrugated pure iron pipe has been employed in the form of inverted siphons to carry the water of irrigation ditches or natural streams under railroad tracks. Where these siphons have been properly installed they have been successful and it is a curious fact that the corrugated pipe clears itself of silt or other obstructions better than smooth material. This is explained by the fact that the corrugations excite ripples in the flowing water which keep the silt in suspension and allow it to be carried through instead of settling in the lowest portion.

In many cases it is found that corrugated iron pipe is cheaper than other forms of construction. On the Northwestern Pacific work for instance, it was found that a 24-in. concrete pipe would have to be laid at a cost of \$17.68 per cu. yd. and a 30-in. pipe at a cost of \$19 per cu. yd. to be as economical as corrugated iron pipe. These figures are exclusive of the headwalls. The average cost of installing the corrugated pipe on this road has been \$0.35 per lineal ft. for 24-in. pipe, \$0.55 for 30-in. pipe \$0.68 for 36-in. pipe and \$0.74 for 48-in. pipe. In installing these culverts, the excavation was made by the contractor at the regular grading price, but the installation of the pipe was paid for by force account, that is, the cost of labor plus 10 per cent. The work was usually done by gangs of Greeks, Italians or Mexicans with little or no skill. The pipe was furnished in 20-ft. lengths, these sections being connected by the coupler shown in Fig. 11. On 48-in. pipe two turnbuckles on opposite sides of the pipe were used. To insure satisfactory installation it was found absolutely necessary to have an inspector on the job to superintend the connecting and laying of the pipe and the making of the back fill. It was also necessary for the engineer directly in charge to see that a wrench for manipulating the turnbuckles and a hammer suitable for heading the cold rivets were on the job. The 24-in.

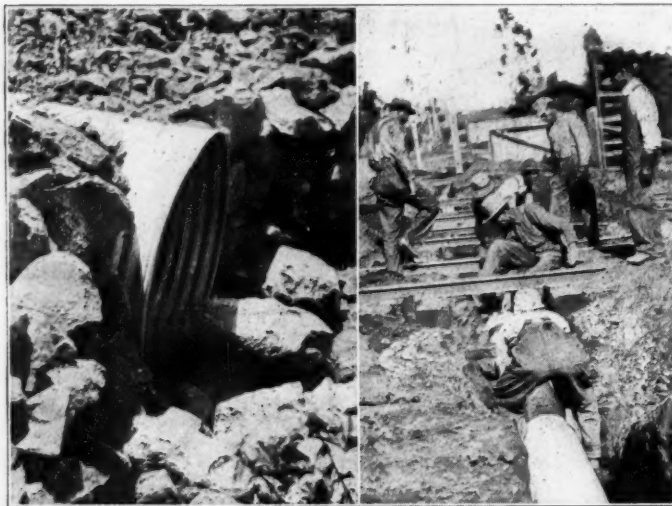


Fig. 9—A 48-in. Pipe Set on a 20-deg. Slope under a 25-ft. Rock Fill Showing Typical Boulders Passing Through this pipe



Fig. 10—A Gang Installing an Ingot Iron Corrugated Pipe Culvert Under the Tracks of the Southern Pacific

pipe was usually connected on the bank and rolled into the trench. Larger pipes were rolled in first and the sections were launched endwise with block and tackle. Two jacks used to spread the ends of the large pipe were found to be a great saving in labor. "Bell holes" were necessary to provide a working space for riveting. After the pipe had been connected the trenches were back-filled, the material being carefully tamped under the pipe and nearly to the top. A continuous cover was laid by hand before allowing material to run down the end of the fill as a large boulder rolling onto a bare pipe would dent it badly and cause a weak spot, inviting failure by crushing.

The cost of freight and of hauling is often an important element in the cost of culverts, particularly on extensions of lines

at a considerable distance from existing transportation. On the new line of the Chicago, Milwaukee & St. Paul between Lewistown, Mont., and Great Falls, it was necessary to haul material in many cases an average of 12 to 14 miles at a cost per ton mile of \$0.35 to \$0.50. This was one of the deciding factors in the decision to use American ingot iron corrugated pipes up to 42 in. in diameter under the low fills on this line.

Another advantage possessed by the pure iron corrugated pipe is its adaptation to temporary as well as permanent locations. If it becomes necessary to relocate a highway or a track under which corrugated pipes have been installed it is not difficult to move the pipes to a new location at a small cost.

Part-circle culverts made of corrugated iron have also been

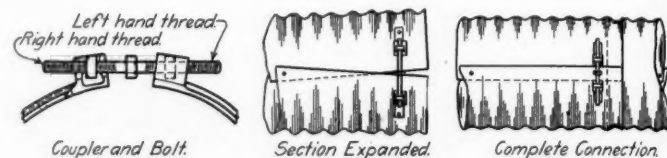


Fig. 11—Details of the Coupler and Bolt Used to Connect Sections of Corrugated Iron Culverts and Sketches Showing the Method of Applying It

used in many instances under railroad tracks principally in municipalities where much of the surface drainage is cared for in this way. This form of construction consists of a segment of corrugated iron of heavy gage set between angle irons held in a concrete base. It is employed only in locations where sufficient head room cannot be obtained for the full circle pipe of the requisite capacity. These culverts are built in sizes ranging from 7-in. base and 2-in. rise to 84-in. base and 42-in. rise. They have given good satisfaction where the width of the base is not excessively great in proportion to the rise and the culvert has a reasonable amount of covering.

We are indebted to J. Harold Lane, assistant bridge engineer, Northwestern Pacific, for the data referring to the installations on that line, and to the National Corrugated Culvert Manufacturing Company, Middletown, Ohio, for the remaining information in the foregoing description.

BRIDGE RENEWAL WITHOUT FALSEWORK OR INTERFERENCE WITH TRAFFIC

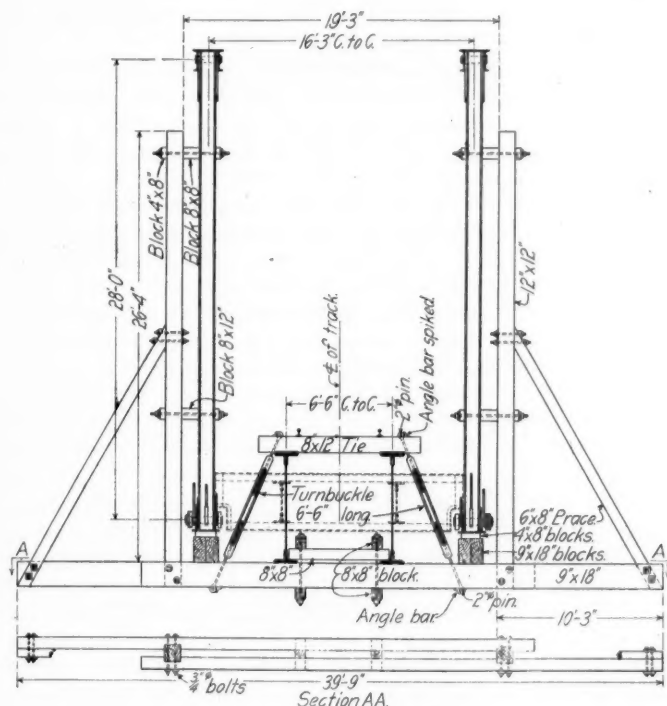
The Wheeling & Lake Erie recently replaced nine bridges, consisting of 130-ft. through Pratt trusses, over Short creek on the east end of the Toledo division, in connection with which an unusual method of dismantling the old trusses was developed. The old bridges were designed for Cooper's E-35 loading and were built by the Edgemoor and the Toledo Bridge Companies in 1897. Their renewal was made necessary by the purchase of a number of locomotives with a loading practically equivalent to Cooper's E-60 that were put in service to handle the increasing traffic from the coal fields.

It was found at all of these spans that successive raises of grade on either side had left the bridges at low points in the profile and as high water data and measurements of the channel showed that additional piers supporting deck plate girders would not unduly increase the danger from floods, it was decided to use 65-ft. deck girder spans designed for Cooper's E-60 loading. The designs were made in the bridge department of the Wheeling & Lake Erie, the steel was fabricated by the American Bridge Company and the King Bridge Company and was erected by the Ferro Construction Company, Chicago.

Although no foundations on this stream were damaged during the flood of March, 1913, it was decided to carry all new footings to rock or to support them on piling. No new abutments were necessary, the old ones being of first-class masonry and still in good condition. They were altered to accommodate the new bearings for the girders, the backwalls be-

ing rebuilt with plain concrete and the bridge seats with reinforced concrete.

The erection of the new spans and the dismantling of the old trusses were handled by a derrick car specially arranged for this work. This car was 47 ft. 9 in. long over all and equipped with a Lambert engine and a three-drum hoist with 10-in. by 12-in. cylinders. The weight of the car was 39,000 lb. and its capacity 100,000 lb. It was provided with a 47-ft. boom con-



Details of the Framing Used to Support Old Through Trusses During Dismantling, Traffic Being Carried on New Deck Girder Spans

trolled by cables running over blocks at the top of a 23-ft. "A"-frame. This boom had a still capacity of 30 tons and a carrying-out capacity of 20 tons. Preparatory to the erection of the girders practically all the rivets connecting the stringers to the floor beams and the floor beams to the posts of the trusses were knocked out and replaced with bolts. The stringers in the panel directly over the new pier were cut by an acetylene torch and were blocked up at points which would not interfere with

the new girders. The trains were allowed to pass over the bridges in this condition until all was in readiness for the erection of the new span.

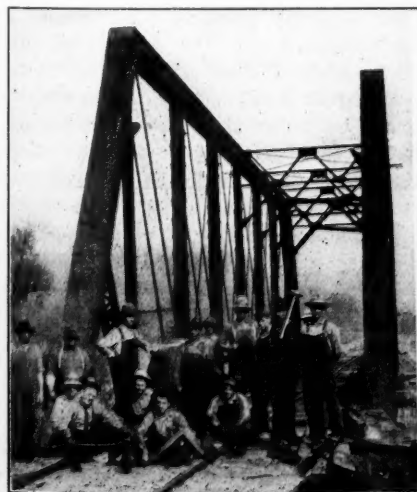
As traffic on this line was light it was decided to hold trains during the operation of renewing each span. At one of the typical bridges shown in the accompanying views, the last train passed over the old bridge at 9:25 a. m. The work of removing the old floor system was begun immediately, the end stringers being removed first and dropped into the creek, the water in which averaged only about 3 ft. deep. This operation was continued until the stringers and floor beams in the first half of the span had been removed. This left a clear space between the old trusses from the abutment to the new middle pier, and the new girders could then be picked up one at a time by the derrick car and placed in position. The top and bottom laterals and the cross frames were then bolted up and the ties and the rails laid on this span, the work being accomplished by 11:25 a. m.

The erection of the second span was carried out in the same manner and was completed, ready for traffic, at 12:40 p. m., 25 min. ahead of the first scheduled passenger train after the beginning of the work. The whole operation consumed 3 hr. and 15 min. The erection was so planned that work could have stopped after the first span was in place, the traffic being carried on the new girders and half of the old truss span. This was done at all of the other bridges.

During the erection of the new span all of the top bracing in the old truss span was removed with the exception of one end portal and one strut which were left to steady the trusses. After the new spans were in place two galleys frames, illustrated in the accompanying drawing, were placed equi-distant from the ends of the trusses to which they were bolted to support these trusses while the chords were cut and the sections taken down. As indicated in the drawing, the galleys frame consisted of two 9-in. by 18-in. timbers under the new girders and attached rigidly to the span by two sets of rods. These timbers supported a vertical 12-in. by 12-in. timber, just outside of each old truss, braced from the outer end of the bottom cross timbers and bolted to the truss posts at two points.

This work was handled under the direction of W. L. Rohbock, chief engineer, and Edward U. Smith, assistant engineer. We are indebted to Mr. Smith for the above information.

GERMAN TRAMWAYS IN SOUTH AMERICA.—It is reported that the German Electric Tramways Company at Santiago de Chile has suspended operations, owing to a disagreement with the local authorities, who have prevented it from charging double fares.



One of the 130 ft. Through Truss Bridges After All Work Preparatory to Renewal Had Been Done



Placing One of the Girders for the Second Span of New Bridge. Derrick Car Working on First Span Just Completed; Photograph Taken About 2 1/2 Hours After One Reproduced at Left

The Handling of New and Scrap Maintenance Materials

The Third and Last Series of Contest Papers, Outlining Several Suggested Improvements in Present Methods

PRACTICAL CONSIDERATIONS IN THE HANDLING OF MATERIAL

By J. W. POWERS

Supervisor of Track, New York Central & Hudson River, Oswego, N. Y.

Those employees of the maintenance of way department, whose duties require it, should familiarize themselves with instructions given with the system of accounts, reports and records prescribed for their department. The object of these instructions should be to secure uniformity in reports, to enforce responsibility for the proper disposition of material and to secure accurate returns for material on hand, received, consumed and taken from track or shipped away. With such information at hand, the requirements of any system may be carried out.

Owing to the increased speed of trains, and the greater weight of engines and cars, it has become necessary to increase the weight of rails on many roads. There is perhaps no one condition more responsible for the necessity of ordering, distributing and carrying large quantities of material, as the difference in weights and dimensions of rails, switches, frogs, guard rails, clamps and braces, tie plates, rail anchors, comprises and insulated joints, etc. It is necessary to have a portion of each kind of material on hand for emergency use, which represents a large amount of money from which little benefit is derived.

The policy on many roads has been to lay the lightest weight of rail that can be operated on, consistent with safety, without a thought to the extra cost of track maintenance. Many roads are using rails 30 ft. long, while the majority of roads are using 33 ft. rails. There is no question as to the relative economy of using longer rails. We believe it is possible to use rails 45 ft. long in many of the southern states and in any locality 36 ft. lengths could be used. The economy of using 36-ft. rails or longer is evident when it is considered that there are $\frac{1}{4}$ less joints in a track laid with 36-ft. rails than in one using 30-ft. lengths. Including the saving in angle bars and bolts and the decreased cost of installing 36-ft. rails as compared with 30-ft. ones, the total saving due to the increased length would amount to over \$80 per mile of track. In addition to this saving it would improve the riding quality of the track.

To reduce to a minimum the material held in stock for emergency use on main track, rails for all tracks, as far as possible, should be of uniform length, weight, and height, except for curves and lead rails in turnouts, where special lengths should be used to bring the joints in the proper position. As to the weight and height, this is also true of frogs, switches, guard rails, clamps, braces and all track appliances.

The most economical and efficient method of distributing material depends upon the nature and magnitude of the work to be performed and the territory to be covered. For heavy work such as unloading and distributing large quantities of rails, ties, etc., or picking up and removing such materials from the scenes of repairs, work can be done more economically, in most cases, by the use of regular work trains. In delivering or picking up small quantities of supplies, it is usually more economical to have the work done by the use of way freight or pick-up trains.

The high cost of handling material by manual labor makes it imperative that labor saving and mechanical devices be used as much as possible to secure economical and satisfactory results. Sometimes substantial saving is effected by using motor cars to pick up and distribute small quantities of material. The loading and unloading of rails, frogs and switches should be done with the best mechanical devices that the company can furnish as such material is often bent and sometimes irreparably damaged by careless handling. Great care should be taken to prevent such material from rolling down embankments and it should be unloaded in such a manner as to require the least amount of

labor to place it in track. Rails or other material should be loaded so as to require the least handling at destination. Track spikes, bolts, switch rods, braces, guard rail clamps and other fixtures should be kept where they are not exposed to the weather until they are applied.

Maintenance of way and other officials should make frequent personal examinations of all tools, appliances and supplies on their respective territories, and if any surplus material or tools be found they should have them returned promptly to headquarters. They should also watch the efficiency of tools and material in service in order to determine their effectiveness. They should see that requisitions for tools and supplies are made sufficiently in advance of the time required to insure their delivery. The lack of proper tools and material is often the cause of unnecessary expense, delay and confusion. Great care should be taken to order nothing except that which is absolutely needed for the efficient and economical execution of work to be performed. When making up monthly requisitions for tools and materials, catalog reference should be given, when possible, with a view of assisting the purchasing agent. Requisitions should also show the quantity and quality of material on hand.

A report should be made to the proper officials of surplus material on hand each month. This will enable them to locate even a temporary surplus and to place the material where it is most needed, thus saving the necessity of purchasing new material. After surplus material has been reported on hand, if any portion of it is used, it should be reported to the proper authorities promptly so that they will be in a position to know what material can be furnished from one division to another.

Material should be distributed, picked up and disposed of with the least amount of labor. This can be accomplished by pre-arranged plans. To illustrate, if a quantity of rail is to be released from main track, provisions should be made in advance for disposing of it, and if sold to outside parties it should be disposed of when the market is favorable. If it is retained for company use, either for emergency or to replace defective, worn out or curve worn rails, it should be picked up and shipped at once to points designated. Large quantities of rail removed from main track should be picked up before the work of spacing and renewing ties under new rail commences, as the old rail, if allowed to remain by the side of the track, retards the work of spacing and renewing ties and increases the cost of this work.

Much time and money can be saved by using good judgment in the unloading and distributing of ties. To do this all ties about to come out should be marked, care being taken not to mark any that would last a year or two longer, but none should be left in track that should be removed. When distributing ties, if marked in this manner, the exact number of ties needed at each point can be determined. Care should be taken to see that they are unloaded where needed. By doing this, money will be saved which would otherwise be lost on account of the time required to re-handle them. If ties are not to be put in track soon after being unloaded they should be piled neatly at proper distances from the track and small trenches dug around them to prevent them from catching fire. If ties to be piled are treated, small quantities of earth should be placed on top of the piles in addition to the trenches, as treated ties catch fire more easily than untreated ties.

The renewing of ties is one of the great items of cost in the maintenance of a railroad and the company should provide the best ties within its means. The proper time for estimating new ties needed is in the fall. If estimates are submitted at this time, favorable contracts can be made and ties delivered when required. When preparing estimates, the foreman should

test every tie of which he is in doubt and request only the actual number needed.

The prompt collection and sorting of scrap and the reclaiming of usable material is not a new subject on many roads, but some roads have only recently realized the importance of giving these matters the attention they deserve. We reclaim a large percentage of track bolts removed from main track in the following manner: We do not allow the nuts to be removed entirely from the bolt until the bolt is loosened in the angle bars. When the nuts are nearly off the bolts, we strike the angle bars with hammer, which loosens the bolt without injuring the thread. After bolts are removed we oil them and screw the nuts on so that they are complete and in readiness for service when needed.

During the construction of new tracks or repairs to old ones, we keep all material picked up as the work progresses, and only enough supplies are distributed to keep the forces engaged and working to good advantage. If material such as bolts, spikes, anglebars, tie plates, etc., is not picked up as the work advances, portions of such material will be wasted and will show evidence of carelessness about work and disregard of company property.

Scrap bins should be built as convenient as possible to tool houses and should be large enough to keep the various kinds of material separate. Foremen and others whose duties require it should be compelled to pick up scrap as often as necessary to secure good results. Employees should never be allowed to leave scrap material where they are working, but should take it to headquarters each night, sort and place it in the bins. This should be picked up once a month on outlying sections either by work trains or by way freights, depending on the amount of scrap that has accumulated. Care should be taken not to mix the various kinds when loading on cars. These cars should then be taken to headquarters and the track scrap sorted and classified by the track forces. The other scrap should be shipped or turned over to the departments where such material is used in order to reclaim the usable material and for the proper classification of various kinds as shown on the forms prescribed for that purpose. A memorandum should be sent to those in charge of the scrap platform showing the approximate tonnage of the various items. They in turn should acknowledge its receipt.

It is important that no labor or time, except what is absolutely necessary, should be expended in handling scrap or other material. Besides the revenue derived from the prompt collection of scrap, it is also in accordance with the Safety First movement now so active on all railroads.

WRONG AND RIGHT WAYS OF HANDLING SCRAP AND NEW TRACK MATERIALS

By W. O. HOUSTON

Division Engineer, Michigan Central, Jackson, Mich.

With the necessity of enforcing economies on our railroads in the past few years, the proper handling of scrap and the reduction of surplus track materials and tools has been a live issue. Some of the methods which have been tried have resulted in a considerable saving, but in many cases the results really obtained have been greatly exaggerated. For example, the writer happens to know of a case on a neighboring road where 60 cars of scrap, were collected by a pick-up train. That sounds like a lot of scrap and the official who originated the scheme and who had only recently come to the road did not fail to call attention to the great saving he had made.

But, as a matter of fact, most all of the scrap collected would have been forwarded to the scrap yard, a carload at a time without extra cost. As it was, the 60 cars were not all loads and several of them contained old barbed wire that had no value and had to be shipped out and buried after it was received.

This train, which was called by the track forces the "robber" train, was on the road a week. It was in charge of a store-

keeper who had with him a clerk, a cook, a roadmaster from another division who passed on the material and tools that might be left, and a force of eight laborers and a foreman. The local roadmaster went along and had the right to protest, but not to decide. The visiting roadmaster was so bound by instructions that he had to take many things that his judgment directed him to leave.

The mode of operation was to stop at every car house, look through, behind and under it, check over all the tools and leave one tool of each kind for each man in the gang. As this road has a great many different kinds and sizes of track bolts there are more different sizes and shapes of nuts on a section than there are men, so that when the wrenches were cut down to one per man there were not enough left to fit all the nuts.

The stock of repair rails offered an apparently good opportunity to make a big showing so all but a very few were loaded up. In the yards there are numerous sizes and sections of rails, and the rails are old and require many changes in a month. A short time after the "robber" train made its trip, the repair rails left were all gone, and they are being shipped back, a few at a time, at a considerable cost for handling.

In the desire to collect all the surplus scrap, the rails that were used to run the section motor cars from the track to the car house were taken, and the foremen were forced to pull boards from the right of way fences to make runways for their heavy cars.

The useless expense described above was not the worst effect of the so-called economy; the effect on the men was much worse. Section men as a rule have trouble in getting all the material they need and when that little they have is taken away they are naturally discouraged and become dissatisfied and do not work with the spirit they should.

Fearing another trip of the "robber" train, the men have resorted to taking such extra tools as they can get hold of to their homes, and otherwise hiding them so they can not be found. As these men leave the service, the company will in most cases lose the tools and the loss will be greater than that caused by having a few extra tools in each car house. Most foremen have been compelled by the methods of furnishing them supplies to conceal quantities of tools and materials, and month after month they fail to report them as on hand. Our best foremen, those who are looking ahead and trying to do the best they can for their companies, have been forced by necessity into such practices, which should never exist. Quantities of materials and tools are always on hand and always will be (under cover) until our foremen learn by experience that it is not necessary for them to misrepresent.

It must be made plain to the roadmaster by his superior officer that the surplus material and tools must be kept to a minimum and that as he goes over the division it is one of his duties to know personally what each foreman has on hand, and, for example, when one man needs a switchstand, and some other foreman has two, to have one of the two shipped instead of making a requisition on the store. It is possible in this way to keep the surplus down, but the mistake must not be made, as it has so often of late, of keeping the stock so low that it is necessary to spike important switches for a day or two at a time while waiting for something that the foreman should have had in stock. It is certainly economy to keep a few switch points and an extra stand or two in a yard where points are apt to be run through.

The most economical method of collecting scrap that the writer knows of and one he has successfully tried is to have a scrap bin at each car house and in convenient places in large yards where the section men collect scrap from time to time. Occasionally, as conditions warrant, have two flat cars start at one end of the division, placing them at each station as near as possible to the scrap bins. The car scrap can be loaded on one of these cars and the track scrap on the other. The cars are then billed to the next station and so on until loaded, when they go to the division scrap yard where the scrap is sorted

by experienced men and the material that can be repaired is sent to the shop. A few days after the first cars start out, two more are started from some other part of the division, and so on, so that a few cars are coming in all the while and the scrap men are kept busy without being flooded with a trainload at a time which would result in tying up a lot of equipment and blocking the yard.

For the distribution of new material it has been found desirable to have a storekeeper make a trip over the division once a month with a couple of supply cars on the way freight, leaving what has been ordered at each car house. This results in prompt and proper delivery and prevents losses which occur when small shipments are made by local freight, especially where material has to be transferred at junction points, because, as a rule, conductors and agents do not take the care in handling company material that they should, and it is often lost or put off at the wrong station, and when found it is a great temptation for foremen to help themselves to what they need when they see it lying around.

DISTRIBUTING NEW MATERIAL AND COLLECTING SCRAP

By P. QUINLIVAN

Roadmaster, Delaware, Lackawanna & Western, Buffalo, N. Y.

In distributing rails, I find it very profitable as well as labor-saving to distribute and set out rails just as they are to go in the track. This saves both labor and train detention, and avoids the necessity of trucking or carrying rails back and forth.

In distributing ties, I find that where a man has a great many ties to put in, it is cheapest to give him about five cars of ties, if possible, and have his gang help the train crew with the unloading. This saves a great deal of work train service.

The distributing of switch timber, switch points and frogs, as a rule, can be handled most easily and economically by billing them in a car direct to where they are to be used, and having the section gang at that point unload them. By this means one can save the cost of a work train.

In my opinion, tie plates should be distributed according to the number of ties a foreman has to put in. That is, if a man has a great many ties to be put in, one can save a great deal of extra handling of this material at the storeroom by sending out about 3,000 plates at once. In this way, he could bill one car of plates to two different foremen. When unloaded these tie plates should be piled up at once and oiled, and if possible put under cover.

Spikes should be shipped out to the different sections in quantities large enough to take care of the requirements of each section for a full month. The foreman could put these in his tool house, and take what he requires out with him each day.

When distributing rails, ties, ashes, or in fact any heavy material, if a full day's work can be arranged, it will save a great deal of expense, for more men are put on the work train to unload this material, and if a shift is made to light material, such as spikes, tie plates, etc., there will be a number of idle men. If, on the other hand, a full day's work unloading small material can be arranged, only a few men need to be used on the work train.

After the renewal of rail, the old rail should be piled in piles of four each between the two main tracks, so that they can be picked up easily by the work train. If this rail is to be used on sidings or yard tracks, it will be well to pick it up just as it is to be handled at the point where it is to be relaid. If this rail is all picked up at once and taken into the yard, it will have to be unloaded and piled, and then loaded up again and unloaded, where it is to be used.

Each day scrap should be picked up where a gang is working and as far as possible put in kegs. The work of picking up this scrap should be given to one man, to be held responsible for any usable material that is with the scrap. This scrap when picked up should be sorted over so as to keep the scrap and usable material separate. These kegs of scrap should be taken to the

tool house once a week and placed where they can be taken up by the work train without any trouble. Scrap anglebars, switch plates, braces, switch rods and other small materials should be kept in separate piles; and scrap frogs, switch points and guard rails should be loaded in separate cars.

SOME PRACTICAL HINTS ON THE DISTRIBUTION OF NEW MATERIAL

By J. C.

The two general requisites in handling material are prevention of loss or waste and reduction of labor cost. Watchfulness and training will generally overcome the former, although the task may prove long and tedious. But to keep down labor cost is a more difficult matter, beset with ever-changing conditions which demand the closest attention. Versatility and ability to quickly see and take advantage of favorable opportunities are required. Large quantities of material, in carload lots, unquestionably can be distributed most economically by work train. It is necessary to assemble a sufficient number of carloads to insure a full day's work in one locality, so that unnecessary train movement may be avoided. A rail unloading machine will prove very serviceable, not only for rails, frogs and switches, but for bridge timbers and other similar material. Such machines reduce the labor cost and make the handling safe, and as their cost is comparatively low, few railroads can afford to be without them.

Material is easily lost or damaged by careless unloading. Rails, ties and other heavy material should not be allowed to roll down embankments. The cost of reclaiming it, if it is ever done, is a dead loss. Ballast should be distributed evenly to prevent waste and rehandling. The unloading of small material, or such as may be inadequately packed, calls for precaution to prevent waste. Such articles are easily lost and rarely ever found.

Bridge material should almost invariably be handled by a work train. Timber should be deposited, if possible, on level ground and in such a manner as to afford carpenters easy and convenient access for framing. Timber should not be stored in big piles, or closely stacked, for then a fire may result in heavy losses. A wrecking crane may be conveniently employed for this class of work, or, if the job justifies the cost, a derrick may be erected for unloading.

It may frequently happen that there are only one or two cars to be released, or that the holding of cars under load for a few days is not objectionable. Under these conditions permission may be secured for a local freight to handle one car each day until all cars are released. This delay is not serious, as a section gang can unload a car of ties in 30 minutes or a car of ballast in 10 minutes. This practice has frequently been tried with success. A load of small material, to be distributed over a long section of line, can be placed in a freight train, and the unloading done by two or three men at station stops. The knowledge of a number of different methods helps the supervisor to decide quickly as to the best manner of disposing of carload stuff.

The intelligent use of this new material demands value received for the expenditure. Rails should not be cut unnecessarily or large timbers cut to pieces. Ties should not be removed when they are good for another year. Switch timbers should not be renewed in sets, as it is common knowledge that those ties under the switch points and frog will go to pieces years before the intermediates. Such ties should be "patched in." All material not intended for immediate use should be safely stored or piled. Unlike other material, there is no salvage in ties.

There is another class of material, however, that presents a very different problem—that intended for emergency use. There can be no set rule for the amount to keep on hand, conditions varying widely on different sections. It is always necessary to keep a supply of ties and rails convenient. This may be safely accomplished by having one central supply of such material and

reducing the amount retained on each section. In yards and on important pieces of track, it is frequently essential to keep duplicate articles on hand. It is a common fault among track men to have a superabundance of such material, the practice doubtless arising from the commendable desire to prevent "tie-ups" on the line. Experience will soon point out the key to a proper reserve supply for each section, not only of track material, but tool equipment also. It is erroneous to allow all sections equal amounts of material. True economy is subserved by adjusting this reserve supply to local conditions. Reserve track material is an accident insurance policy for a railroad and is entirely proper, provided the annual premium is not out of proportion to the benefits derived.

But all of this good material will some day be unfit for use, will be removed from track or structure and the trackman will again find himself face to face with economy, efficiency and responsibility. What is scrap? Material may be taken from the main line, unfit for service, and yet be very serviceable in secondary tracks and yards; timber may be unsound at ends and in good condition for three-fourths of its length; a frog may have a broken wing rail, readily repaired at the shop. Such material is not scrap, but is too often classified as such, resulting in very large loss. The temptation to use new material is always alluring, but constant supervision and training must teach men that no material, fit for further use, should be discarded.

Large quantities of second-hand or scrap material may be collected in a manner very similar to that laid down for material distribution. In such instances it is very desirable that shipping notices of such carload lots be furnished promptly so that material may be forwarded and the expense of rehandling avoided. Smaller quantities of scrap, such as ordinarily accumulate on the roadbed, should be gathered up daily by track men in the vicinity of their work. It can be taken on the hand car to tool house or some convenient commercial siding. In this manner there can be no undue accumulation on the line at any time. About once a month a car should be started over the division in the direction of scrap headquarters, and "set off" at points where track men have deposited the gathered material. Usually a fraction of an hour is sufficient for loading scrap and the car is ready to move forward next day. Upon reaching scrap headquarters, the material is classified and deposited in proper bins. This method entails some additional work on the local freight, but has the advantage of reducing track labor to a minimum as well as avoiding the use of a work-train movement over a division, resulting not only in a large loss of time, but interference with train service as well.

HANDLING OF MAINTENANCE MATERIAL BY THE MAINTENANCE DEPARTMENT

By J. T. BOWSER

Queen & Crescent Route, Danville, Ky.

The "general stores" system has received so much favorable mention, and has apparently succeeded so well in many cases, that it requires some hardihood to raise one's voice against it. But I will venture to say, that hardly 10 out of 100 maintenance of way officers will agree that the general stores plan serves this department as well as it could be served with a store room of its own, operated independently of all other departments.

In theory, a general store for all departments is ideal. The large purchases bring lower prices, and simplify accounting; the stock is centralized and is in the care of a skilled storekeeper. In practice, however, is it so satisfactory to the maintenance of way department as the store devoted entirely to the material used by the maintenance of way department and supervised, in a general way at least, by the division maintenance of way officer? Can he not, with a little attention, keep his stock down to a proper figure as well as a general storekeeper who probably possesses little or no intimate knowledge of the needs of the maintenance department?

The lack of this intimate knowledge of maintenance affairs may result either in an overstock of some classes of material,

or a shortage in others. Such conditions do not necessarily indicate any lack of ability in the general storekeeper. It is manifestly impossible for a man in charge of a large general storeroom to keep in as close touch with conditions in the maintenance department, as could a division storekeeper serving only this department and directly under the supervision of the division maintenance officer.

A good maintenance of way storekeeper can no doubt be readily selected from the same material from which supervisors are drawn. At any rate, he should be a man of some track and bridge and building experience, possessing a fair education and some executive ability. A man of this character should experience no difficulty in looking after the maintenance material for one or possibly two divisions, and, in addition to this, should be able to supervise the classification of scrap material and the reclaiming of good second-hand material. With the comparatively small territory supplied from his storeroom he should be able to keep in very close touch with conditions through the supervisors and the division office and increase or decrease his stock of certain materials as necessary.

Further, reporting, as he would, direct to the division maintenance of way office, that office can more readily supervise his orders and issues. The money which might be lost on making a number of small purchases for local storerooms, as compared with the large purchases of the general store, would probably be more than covered by the saving effected by prompt shipments of small quantities, not always to be had with the more unwieldy organization.

A local maintenance of way store should provide, not only storage room for the material which must be kept under cover, but should also have yards for timber, bins for scrap, sheds for spikes, bolts, etc., and a small shop of some description for reclaiming second-hand material requiring only light repairs. The maintenance of way storekeeper should have entire charge of the storeroom, lumber, skidways, scrap bins and shop, and should be held entirely responsible for the conditions thereabout, and for the amounts of material on hand.

Orders from section foremen or other maintenance of way department employees, should be approved by the supervisors to whom these men report, and should be checked in the division maintenance of way office before being sent to the storekeeper to be filled. The storekeeper should be required to keep a record of issues so that a check is available on material issued to each foreman, but all accounting should be handled in the division of general offices.

Requisitions to replenish stock should be forwarded by the storekeeper each month to the division maintenance of way office. These requisitions should show the amount of material on hand, the average monthly consumption as well as the amount required. A very careful check of these orders should be made in the division office.

In order that the chances for a shortage in any particular line may be reduced to the minimum, the storekeeper should be required to make a monthly report with his requisition, showing the amount of material which he has on hand of which heavy issues are made, such as spikes, bolts, etc. With such a report at hand the division officer can more readily avoid a shortage in stock when work which he may have in mind will cause an unusual demand for certain classes of material.

The storekeeper should keep the office advised of any over stock or of any obsolete material on hand, so that arrangements can be made to dispose of such material. He should, of course, take inventories of stock on hand as required and should also be required to make regular reports of scrap material on hand for sale.

Arrangements should be made to provide the storekeeper with the necessary labor to handle heavy material, to classify and load scrap, and for other work about the store or yard. A section gang with a short section will provide enough men to handle his work, in case there is not enough work to keep a gang busy at all times, and there will be no loss of time as the

gang could return to track work when released by the storekeeper.

It should not be necessary for road supervisors to make monthly requisitions, though it is not a bad idea to permit them to keep a small supply of spikes, a frog and switch, and similar material on hand at their headquarters for emergency use. Special requisitions submitted by bridge and building supervisors for special jobs should be submitted to other supervisors, with the view of ascertaining if any of the material can be furnished by them from stock left over from other jobs.

Periodical inspections should be made of tool houses, tool and supply cars by the proper officers, and foremen should be required to return to the storeroom all material or tools not needed for immediate use. Employees should be impressed with the scrap or second-hand value of the material which they handle, so that they will care for it properly and return it to the storeroom. Scrap material should be collected regularly. A plan which is giving satisfaction on some roads is outlined below: Foremen are required to assemble all car and track scrap at convenient points on their sections. Scrap cars are placed on local freights each month on fixed days, and the conductors on these trains are instructed to stop when flagged and permit section men to load the scrap. Car and track scrap should be loaded in separate cars so as to avoid rehandling at scrap yards. In this manner any great accumulation of small scrap on the line of road can be avoided.

When these cars arrive at the storeroom they are placed at the classification bins so that both the unloading and classifying are done in one handling. With the proper care at the time the classification is being made, a great deal of good material may be recovered and made fit for further use. Reports of scrap material on hand for sale should be made by the maintenance of way storekeeper.

With the maintenance of way stock divided into reasonably small units, each in charge of an experienced maintenance of way man reporting directly and solely to a maintenance of way official, there should be no difficulty in keeping the stock balance down to a reasonable amount, and still furnish the material promptly and in the quantities needed.

DISTRIBUTING TIES, RAIL AND BALLAST

By W. S. TAYLOR

Superintendent of Terminals, Chesapeake & Ohio, Covington, Ky.

In distributing new ties the cars should be billed to various sidings along the line convenient to points where they are to be used, so that the work train will not have far to run for ties. A supply of 21 cars should be contemplated for a day's work, using three forces of six men each, and placing a force at work on each car. Before starting, each force should be instructed as to how many ties are to be unloaded at each stop, the train crew, of course, having been advised as to what stops to make and where ties will be unloaded.

After rail is received the work train and rail derrick should be secured and the cars distributed at points along the line so they can be easily reached by the work train which is to pick up two cars at each time, placing one at each end of the rail derrick. In this way two cars can be handled at a time without any switching. A car of joint splices should be carried along with this train and one man placed in charge to distribute rail joints with each rail unloaded. When new rail is laid the old rail should be unjointed and the nuts taken off the bolts with wrenches and put back in the old joints. Those nuts that cannot be unscrewed should be broken off, the old bolts placed in the keg the new ones were taken from, and when the kegs are full placed at the tool house to be loaded on the scrap train. The old rail is to be loaded in the same manner that the new rail was unloaded, that is, with a car on each end of the rail derrick, the scrap rail being allowed to remain until last and picked up by itself in the same manner, using two cars at each end of the derrick, if there is enough scrap rail to justify the use of two cars.

In distributing ballast a work train should be ordered and enough cars given it for one day's work. The supervisor of track should go along to see that the ballast is properly distributed and not too much dumped at any one place. When conditions will permit, the same engine and train crew should be kept on the work train until the job is completed. If the work is done in the terminal, the yardmaster should pick his best yard crews, while if on the road, the trainmaster should pick his best road crews and see that the train despatcher gives the work trains all the help possible.

THE DISTRIBUTION OF NEW MATERIAL AND COLLECTION OF SCRAP

By E. K. COGGINS

Chief Clerk to Roadmaster, Southern, Knoxville, Tenn.

The work of distributing or picking up the heavier track materials, such as rail, crossties, switch timber and ballast, can best be done with the use of a regular work train, and movable force under the supervision of the track supervisor or roadmaster. The material can be put where needed and handled more satisfactorily and economically with a gang of men which is organized and trained for the purpose than by bunching several section crews to load or unload the material with the local freight trains.

The miscellaneous roadway scrap, such as spikes, bolts, tie plates and anglebars, together with all kinds of car and engine scrap, that is continually falling from trains, should be picked up daily by the section men in connection with their other work and assembled at their headquarters for shipment to the division or district scrap pile. One day in each month should be known by all concerned as "scrap day," and each section force should be required to go over the entire section with a push car, the whole gang walking, and search the track and right of way carefully, gathering every piece of scrap from the broken spike or bolt to the draw head, brake rigging or car door, and hauling it to the nearest station.

Before the end of each month the supervisor should arrange for his month's supply of spikes, bolts, tools and other light material and supplies, to be handled in a car over his territory, preferably by the local freight on scrap day. The roadmaster or supervisor should accompany this car, and furnish each crew with the actual amount needed for the next month's work. The section men can arrange to meet the train on that day, receive their supplies, exchange their old tools for repaired ones and load the scrap and surplus material.

At least two cars should be used for the scrap, so that the roadway and mechanical material can be kept separate. This is necessary when applying the scrap on sale orders, as the different classes are sold at different prices, and besides, each department should have the proper credit for its material. It is also necessary for the mechanical scrap to go direct to the shops for the purpose of being sorted, as a greater part of that which has dropped from trains can be used again. The time spent by section men in gathering scrap is profitable and a section crew will soon pick up enough at the price it brings to pay for their time and have a nice surplus for the railway company.

THE RAILWAYS OF GERMAN EAST AFRICA.—In the construction of their Colonial Railways the Germans apparently were not unmindful of their defense. Their greatest system, the Dar-es-Salaam-Tanganyika Railway, commonly called simply the Tanganyika Railway, was completed last year, and is approximately 780 miles in length. At Tabora, 530 miles inland from Dar-es-Salaam, where many great trade routes converge, the Germans constructed a massive modern fortress. The great value of the railway as an economic factor lies in the fact that it borders on three great inland seas—Nyassa, Tanganyika and Victoria Nyanza—thus linking up the trading centres, the great lake system of Central Africa, and the River Congo with the east coast ports.

Methods of Conducting Annual Track Inspections

A Resume of the Practices of a Number of Roads to Stimulate the Efficiency of the Maintenance Forces

There is a wide divergence of opinion regarding the advisability of making annual track inspections and awarding of premiums as a means of promoting efficiency among the employees in the maintenance of way department as well as regarding the advantages secured from such practices. The objection most frequently raised to the annual inspections and to the award of prizes is that track work receives a temporary stimulus immediately preceding the inspection and that the efforts of the track forces are directed towards having the track in the best possible condition at the time of inspection to its possible neglect at other seasons. Those opposing this practice argue that better results may be secured by giving close personal attention to the matter of supervision and to the maintenance of a uniform condition of track throughout the entire season. On the other hand, officers of those roads on which the track inspections have been regularly adopted feel that such inspections are supplementary to continued close supervision and therefore do not result in the standards being lowered during the early part of the season, but provide an added incentive for good work.

An important advantage of a systematic inspection, especially when participated in by supervisors and track foremen in conjunction with the higher officers, is the opportunity for instruction regarding standards. Such a trip also offers an opportunity for these men to meet and to discuss many matters of interest to their departments while on the ground, enabling conclusions to be drawn with reference to methods of doing work more satisfactorily or for making improvements while the conditions are clearly before them without the delay resulting from correspondence.

On the roads which maintain a systematic method of inspection, the methods differ widely, from that of basing the awards upon one annual inspection to that of determining them upon several inspections made at intervals as frequent as six weeks to overcome as far as possible the tendency of the men to create a temporary artificial standard.

The number of roads which conduct such inspections, several of whom have retained this practice for a considerable number of years, indicates that they have found them profitable. The plans followed vary to a considerable extent according to the attempts of the officers of the individual roads to overcome objections which may appear more or less important to them. Because of the general interest in this subject we will outline the methods adopted in making inspections on a number of roads during the past season.

Probably the first road to adopt a system of track inspection permanently was the Pennsylvania Railroad. This road has also developed one of the most comprehensive methods of inspection, while the prizes offered are the largest. As the development of this system was described in detail in a recent issue (*Railway Age Gazette*, January 22), we will not refer further to it here.

PENNSYLVANIA LINES

The Pennsylvania Lines also conduct an annual track inspection which, however, differs materially from that on the parent system east of Pittsburgh. On the Pennsylvania Lines the inspection is confined to one annual trip over certain of the main lines, usually covering the Pan Handle from Pittsburgh to Chicago and the Fort Wayne on the return. The inspection party consists of the general manager and his staff, including the chief engineers maintenance of way and their assistants, the general and division superintendents, the division engineers, the assistant division engineers and the supervisors, and it travels by special train.

Three main prizes are awarded annually; one for the best supervisor's sub-division based on line and surface; another

for the best track foreman's section based on line and surface, and a third for the best supervisor's sub-division based on all points. In addition, a smaller prize is given to the track foreman on each supervisor's sub-division having the best section based on all points. The first two prizes are determined by the markings of a special committee composed of two superintendents, two division engineers and two supervisors, all from portions of the line not under inspection. The third prize and those for the section foreman are awarded by another committee composed in a similar manner.

LACKAWANNA.

The Delaware, Lackawanna & Western adopted a new method in making its annual inspection this year in that the inspection was made by a committee composed of three experienced maintenance of way engineers not connected with the road. This committee consisted of A. H. Weston, track engineer of the Lackawanna Steel Company; H. S. Rogers, engineer maintenance of way of the Delaware & Hudson, and S. B. Rice, engineer maintenance of way of the Richmond, Fredericksburg & Potomac. This committee was accompanied by the chief engineer and principal assistant engineer of the Lackawanna with the roadmaster in charge of each sub-division under inspection.

Each section and sub-division is given a rating. The best section on each division is recognized by awarding to the foreman a gold medal, while a silver medal is given to the foreman having the second best section. Section foremen winning the first prize for three consecutive years receive an additional reward of \$10 per month in addition to their salary, while their names are also placed on an efficiency list. This honor has already been secured by several foremen. If the result of the annual inspection for any year shows this section inferior to any other on the division the extra compensation heretofore granted the foreman ceases.

NORFOLK & WESTERN

The Norfolk & Western makes an annual inspection in October of each year. Previous to this year it was made by the section foremen, who were divided into committees, each committee being composed of all the foremen on one roadmaster's division. The party travels on an inspection car which is carried on regular trains wherever that is practicable. No committee was allowed to inspect the same division two years in succession, nor to participate in the inspection of its own division. Before beginning the trip the roadmaster appointed one subcommittee on line and surface, another on switches, frogs and road crossings, a third on ditches and roadbed, another on right of way and fences and one on station grounds and policing. Each member of each subcommittee was furnished an inspection blank and gave his undivided attention to the particular subject assigned to him. A rating was given to each section and at the end of the trip the forms were taken up and the averages figured.

By this method the inspection was made by the foremen instead of by the higher officials and there were no complaints of unfairness or partiality. Aside from the rivalry created one of the principal advantages noted was the promotion of uniformity of work and compliance with standards. A disadvantage of this method of inspection was that each division was inspected by a different corps of men, some of whom marked on a higher basis than others. It was not, therefore, possible to make a comparison between the different divisions, although the relative standing of sections on any one division was clearly shown.

The method was changed last year, therefore, so that the roadmasters on each of the two general divisions made an

time. The inspection last year was made in June and covered about 600 miles of track. Three days were required for the trip, which was made by a special train consisting of the necessary tourist sleepers, a dining car and a coal car fitted up with a canopy and with seats for use as an observation car.

The inspection is made by the section foremen themselves under the supervision of the superintendent maintenance of way and such other officials as he may designate. Last year all the section foremen were assembled at one end of the line. The supervisors, trainmasters and roadmasters accompanied the inspection train over their own districts. The entire party was composed of about 80 men. Each man was provided with a rating card and each division was inspected and rated by the foremen from other divisions. The men were required to inspect personally each frog and switch on the ground to impress upon them the importance of this detail of track maintenance. Rails, ties, embankments, ditches, etc., were also examined and the men discussed in detail any apparent faulty or good work that came to their attention. In the evening short talks were made by the superintendent maintenance of way on general subjects such as safety, discipline, loyalty, etc., and the foremen were called upon to express their opinion on these subjects in open discussion.

Premiums are awarded to the track supervisors having the

each grand division. Similar prizes are also awarded on branch lines, those for the supervisors being the same as on main lines, while those for the section foremen are \$50 and \$25, respectively. Suitable signs are also placed at the section houses of the prize sections. In awarding prizes the winners of the previous year are not allowed to compete, but are expected to maintain the showings made previously. This inspection is made at the close of the track work each year.

CANADIAN PACIFIC

For the past two years the Canadian Pacific has awarded annual prizes for the maintenance of track. Sixty-two prizes in all are awarded, consisting of 1 general manager's prize, 4 general superintendents' prizes, 14 division superintendents' prizes and 43 roadmasters' prizes, all of which go to section foremen.

These prizes are based upon the quality of the work done by the various forces throughout the season rather than on the actual physical conditions on the different sections at the end of the season. Careful consideration is given to the condition of and the work done on ditches, spiking, lining, maintenance of surface, rail wear, switches, sidings, station grounds, fences, etc. The amount of labor expended, the physical condition of the sections as regards grades, alinement, drainage, etc.,

NORFOLK & WESTERN RAILWAY COMPANY.

INSPECTION BLANK.

October _____ 191__

Division.		R. M. Division No.										Average	
		SECTIONS—CONDITION (10 Perfect.)											
SECTION No													
Line and Surface													
Switches, Frogs and Road Crossings													
Ditches and Roadbed													
Right of Way and Fences													
Station Grounds and Policing													
TOTALS													
AVERAGE													

Hocking Valley

22d Annual Track Inspection

District _____ Section _____

Inspector will note his opinion of the average condition of each mile by numbers ranging from 50, very poor, to 100, perfect.
60 indicates poor, 70 fair, 80 good, 90 very good, and intermediate numbers, other variations.

Miles		REMARKS
1		
2		
9		
10		

Inspector.

Sample Inspection Record Blanks

best maintained districts and to the section foremen on each supervisor's district having the best section. In addition, an attractive sign is placed on each premium section.

THE ERIE

The Erie also conducts an annual track inspection, using a car which records automatically the gage and the cross level of the track, low joints and car swings or lurches. In connection with this autographic record consideration is also given to line and surface, ditching, policing and the general appearance of the track and right of way, officers marking on these various points entirely independent of the autographic record. In awarding prizes consideration is also given to the expenditures made on the various sections and due credit is given to those supervisors and foremen maintaining the best track at the least cost.

A prize of \$200 is awarded to the supervisor having the best maintained sub-division and another prize of \$100 to the supervisor having the second best sub-division. The section foreman maintaining the best section on each supervisor's division receives a prize of \$100, while a second prize of \$50 is awarded to the foreman having the second best section on each sub-division. A special prize of \$150 is also awarded to the section foreman having the best section on

and the character of the roadbed are also taken into consideration, as is the amount of extra gang work. As the end of the season approaches each roadmaster carefully considers these conditions for each section on his territory and reports to the superintendent of that division the foremen who should receive the prize. The division superintendent and the resident engineer then select the prize sections on each roadmaster's district on that division and select the winner of the superintendent's prize, reporting this to the general superintendent. The latter officer in consultation with his division engineer then decides which superintendent's prize section is entitled to the general superintendents' prize. The best section on each division is then inspected by the general manager, the engineer maintenance of way and the division officers who award a general manager's prize.

ROCK ISLAND

The Chicago, Rock Island & Pacific conducts a track inspection during October and also in the spring of each year. The Rock Island is divided into three grand districts. A committee on each district, consisting of the general manager, the assistant general manager, the engineer maintenance of way and the division superintendents, goes over the track early in the spring before active work begins and again

after the season's work has been completed. These committees mark the several points on the following basis:

Line and surface.....	Value 65 marks (Maximum)
Ditches, drainage and roadbed.....	" 15 " "
Frogs, switches and joints.....	" 10 " "
Spacing ties	" 5 " "
Right of way, fences and station grounds....	" 5 " "

In the spring the markings are made for each section strictly in accordance with the above. Between the spring and fall inspections a record is made of the actual expenditures on each section, due regard being given to the placing of new rail or ballast for any extra gang work. On the fall inspection the markings are again compiled, due consideration being given to the condition of the track, the amount of money spent, etc. The improvement in percentages on each section is noted and the section foreman whose track shows the greatest percentage of improvement on each roadmaster's territory is awarded a prize. In this award the actual physical conditions existing on those sections such as the character of the soil composing the roadbed, the condition of the rail and other items which would materially affect the work of the foremen are also considered. In the same general way prizes are awarded to the roadmasters on each division whose territories show the greatest percentage of improvement on all sections. It is the belief of the officers of this road that material benefit has been secured since the

as they pass over them on the basis of 10 as perfect. While these results are tabulated, no prizes are awarded to the foremen or supervisors.

That evening the men are given a banquet and a theater party. On the following day the party travels by special train over the main line of a neighboring road to give the men an opportunity to observe the track conditions and the standards of maintenance on other lines. Three years ago this party traveled from Erie to Buffalo over the Lake Shore and then to Niagara Falls and return over the New York Central & Hudson River. In 1912 this trip covered the lines of the Pittsburgh & Lake Erie and the Lake Shore & Michigan Southern from Pittsburgh to Erie, while in 1913 the party went over the Baltimore & Ohio from Pittsburgh to Cumberland, returning over the Western Maryland and the Pittsburgh & Lake Erie. Last fall the trip was concluded at Pittsburgh without a visit to any other line.

NEW YORK CENTRAL

The New York Central & Hudson River has conducted an annual inspection of main and branch lines for a number of years. The main line between New York and Suspension Bridge is inspected by a main committee, while the branch lines are inspected by sub-committees composed of maintenance officers from other divisions. No prizes are awarded to the supervisors, but the foremen receiving the highest rating

BESSEMER & LAKE ERIE RAILROAD CO.

Report of Condition of Track

1914

Super-visor	SECTION FOREMAN	COMMITTEE No. 1		COMMITTEE No. 2			Sec. No.	COMMITTEE No. 3		COMMITTEE No. 4				Total	Average
		Line	Surfacing	Ballast	Switches	Sidings		Joints	Spacing Ties	Ditches	Road Crossings	Station Grounds	Policing		
W. & SUTLES	36 C. M. Pomeroy						36								
	4 W. D. Heilner						4								
	5 J. P. Sheehan						5								
L. G. MARTIN	6 L. W. Wescott						6								
	7 T. M. Sheehan						7								
	8 M. A. Hunt						8								
	9 T. W. Wescott						9								
	10 J. S. Swartz						10								
	35 Joseph Bell						35								
	TOTAL														
	AVERAGE														

PARTY USING THIS CARD WILL SEE THAT HIS NAME IS WRITTEN ON THE BACK

Bessemer & Lake Erie Inspection Card

adoption of this system four years ago. One defect, however, has been realized in that while the section foremen may by the application of hard work receive a high rating in the spring, this acts against him in the comparison in the fall when the percentage of improvement is not as great as on such sections where the track may have been neglected during the winter. Studies are now being made to remedy this condition.

BESSEMER & LAKE ERIE

The method of conducting the annual track inspection on the Bessemer & Lake Erie varies considerably from those described above. Ordinarily the inspection covers two days. The first day the party, composed of all the section foremen and supervisors, the engineer of track, and the chief engineer, assembles at one end of the line and travels over it to the other end. Four committees, each consisting of four men, are appointed to consider line and surfacing; ballast, switches and sidings; joints and tie spacing; and ditches, road crossings, station grounds and policing. The members of these committees mark the condition of the various sections

on each main line subdivision receives a premium of \$3 per month for the ensuing year, while the foreman having the best section on each main line division, except the Electric division, receives an additional premium of \$2 per month. On branch lines the foreman having the best track on each subdivision receives a premium of \$2 per month, while a premium of \$3 per month is awarded to the foremen receiving the highest ratings on yard sections. The object of the system on this road is to reward the foremen for individual efforts during the year rather than for the appearance of their sections on the day of inspection. For this reason the amount of work done on the different sections during the year is taken into consideration and certain sections receiving high marks are excluded in making the award of premiums because of extra gang work on them or because the foremen have been in charge of these sections for only a short time.

ENGLISH RAILWAYS

It may be interesting to note that similar methods of inspection are employed on several foreign railways, including the London & Southwestern and the Northeastern railways

of England. On the latter road challenge cups, medals and money prizes are awarded to the maintenance of way forces. To determine these awards an inspection is made by special trains with observation cars traveling at a rate of about 20 miles per hour. Ten days are spent in the inspection of the main lines, while three days additional are spent in the inspection of the yards, which latter inspection is made on foot.

One committee confines its attention entirely to the alinement and surface of the track and to the condition of the joints, while the second committee observes the general appearance of the ballast, fences, policing of the right of way, etc. These committees are divided into sections each of which remains on duty about an hour at a time.

In the marking of the first committee all faults noted by the judges are recorded and values are assigned to them according to their nature. The number of these defects is then divided by the distance traveled over in each section to bring them to a standard of so many defects per mile. The supervisor is present during the inspection to advise the judges of the limits of the sections and to answer any questions they may desire to ask. A list is prepared giving the number of defects per mile on each section, that with the least number receiving the highest award. In arriving at the final decision, allowances are made for sections being short-handed, for the age of rail, the nature of the traffic, etc.

The prizes consist of a director's challenge cup and a silver medal for the best supervisor's division, an engineer's challenge cup and a silver medal for the best section, and a district engineer's challenge cup and a silver medal for the best section in a busy yard. Money prizes of \$15 each are also awarded to each of eight supervisors, and of \$5 to each of 45 section foremen, with smaller prizes to the laborers in their gangs.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since January 22, 1915:

One Effect of Retrenchment in Maintenance of Way Expenditures.—An editorial commenting on the relations between maintenance of way and maintenance of equipment expenditures was published in the issue of January 29, page 175.

New I. C. Station and Track Elevation at Memphis.—The new union station built by the Illinois Central at Memphis, Tenn., and used also by three other roads, and the track elevation work involved in the construction of the new line to reach this terminal were described in the issue of January 29, page 179.

New Car Ferry of the Florida East Coast Railway.—An illustrated description of a car ferry recently completed for the Florida East Coast to complete the "all-rail" route between the United States and Cuba was published in the issue of January 29, page 188.

A Comparison of the Old and New Lines of the Canadian Pacific at Rogers Pass, B. C.—An abstract of a statement by J. G. Sullivan, chief engineer of the Canadian Pacific, outlining the economies which it is expected will be effected by the construction of the five-mile tunnel at the summit of the Selkirk mountains, was published in the issue of January 29, page 194.

New Bridge Across the Mississippi River at Keokuk.—An illustrated description of the double-deck structure for which the contract has been let, to replace an existing structure across the Mississippi river at Keokuk, was published in the issue of January 29, page 200.

Unemployment on Railroads.—Attention was called to the possibility of reducing the amount of unemployment by distributing maintenance work more uniformly over the year, in an editorial on this subject in the issue of February 5, page 214.

Some Record-Breaking Construction Projects.—An editorial recalling the numerous construction projects now under way which are of unusual size was published in the issue of February 5, page 216.

Progress on Summit Cut-off of the Lackawanna.—An illustrated description of the present stage of the construction work on this 40-mile cut-off, including two reinforced concrete viaducts of exceptional size and a tunnel 3,630 ft. long, was published in the issue of February 5, page 235.

The Price of Rails.—An editorial commenting on the action of the Algoma Steel Company, a Canadian corporation, in quoting open hearth rails at \$25 per ton on board cars at the mills, as compared with \$30

at the mills quoted by manufacturers in the United States, and the purchase of such rails by at least three American roads, was published in the issue of February 12, page 253.

Plans for the New Union Station at St. Paul, Minn.—The details of a plan proposed by the St. Paul Union Depot Company, representing the nine roads entering the city, covering a new union station and passenger terminal development to cost about \$15,000,000, was described and illustrated in the issue of February 12, page 261.

National Association of Scale Experts' Convention.—The report of this convention, including an abstract of a paper by A. Malmstrom, chief scale inspector, Atchison, Topeka & Santa Fe, on Foundation, Construction and Care of Track Scales, was published in the issue of February 12, page 269.

IMPORTANCE OF PROPER AGGREGATES IN CONCRETE CONSTRUCTION

By MACRAE D. CAMPBELL

Although there is an enormous amount of concrete apparently giving satisfactory service, there is also much that is not as good as it might be, as the result of one of several causes. Perhaps the greatest amount of poor concrete results from indifference in selecting and proportioning aggregates.

Only good, hard, clean, well-graded aggregates should be used. No bank-run material should be used without screening and re-proportioning the fine and coarse materials, so as to produce a properly graded bulk of aggregate containing a minimum percentage of voids. Standard specifications carefully define the



The Working Face of a Gravel Pit Containing Pockets of Clay and Loam

materials that shall be known as "fine" and "coarse" aggregate. Fine aggregate, commonly referred to as sand, should be suitable, hard, durable, clean material, passing a No. 4 sieve. It should not contain more than 10 or 12 per cent of material passing a No. 50 sieve nor more than 5 per cent passing a No. 100 sieve. The coarser particles should predominate to produce strength and density. Coarse aggregate is material retained on a No. 4 sieve and containing particles which range from $\frac{1}{4}$ in. up to and including $1\frac{1}{2}$ or 2 in. in greatest dimension, although in some cases this maximum may be exceeded in massive construction. This should be clean granite, trap rock, conglomerate, gravel or other hard, durable material, free from dust, loam, vegetable or other objectionable matter.

Clay, when it exists as a coating to the particles of aggregate, is undoubtedly injurious, as it prevents the proper adhesion of the cement to the surface of the sand particles. When clay of a silicious nature exists to a small extent throughout the mass of

the aggregate, in the form of separate particles, it appears to cause no serious harm in many kinds of concrete work; nevertheless, it is an adulterant and its presence is not desirable.

In many instances it is absolutely necessary to wash sand and gravel to remove objectionable matter before using them in a concrete mixture. This necessity is made apparent by one of the accompanying illustrations, which shows a gravel bank with overlying soil consisting largely of loam and organic matter, in part distributed in pockets through the bank. One can readily see that concrete made from material taken from such a source, and used without washing out the loam and other refuse, would be of very poor quality.

Forceful proof of this statement appears in the second illustration, which shows a pier in which bank-run aggregate obtained from the pit mentioned was used for the concrete. The disintegration that took place in the surface concrete before the pier had even been placed in service is apparent. Presumably the



Disintegration of a Concrete Pier in Which Bank Run Gravel From the Pit Shown in the Other Illustration Was Used

composition of the concrete throughout the structure is of a quality indicated by the surface.

That bank-run material is not suitable for concrete aggregate in its natural state can easily be shown by screening it. The average bank-run gravel will be found to contain at least twice as much fine material as coarse, while the proportions of fine to coarse material for good concrete should be practically the reverse; that is, about twice as much gravel as sand.

Two important and desirable qualities requisite in most concrete construction depend in great part upon proper grading and proportioning of materials; first, density and hence maximum strength; and second, watertightness. In the majority of gravel pits there is a great variation in the sizes of grains and pebbles and in the quantities of each. The same applies to deposits of gravel found in river beds and streams, where the current of water usually separates the different particles and makes regrading necessary.

One load of apparently good gravel from a pit is no indication

of the run of the entire pit. No two loads from the same deposit will show the same proportions of sand and gravel. The fine and coarse materials are usually distributed in irregular seams and pockets, and when excavating begins on the face of the pit consequent drifting or falling down of materials does not produce a proper mixture of fine and coarse particles, regardless of how well mixed they may appear.

Aggregates may appear good yet be totally unfit for use. Casual examination is far from being a safe guide. Actual laboratory tests are sometimes necessary, but in all cases, construction foremen should be warned against using bank-run gravel without properly screening and reportioning the fine and coarse materials.

Concrete mixtures made from bank-run gravel not only contain less cement per cubic foot of concrete, but the strength is reduced by the excess of sand. Experiments have shown that it is not only necessary but economical to pay laborers to screen bank-run material, so that it can be properly regraded and reportioned.

It is not possible to produce an actual 1:2:4 mixture by taking 1 part of cement to 6 parts of ordinary bank-run gravel. A simple demonstration will show that the 1:2:4 mixture is richer in cement than the 1:6.

Take for example 2 cu. ft. of sand to which 1 cu. ft. (1 sack) of cement is added. When mixed together the cement is practically lost in the voids in the sand, so that the resulting mortar is very little over 2 cu. ft. in volume. When this mortar is added to 4 cu. ft. of crushed stone or screened gravel, properly graded, the same condition is repeated. The mortar is practically lost in the voids of the stone or gravel. As a result the volume of concrete is but little in excess of 4 cu. ft.

Even assuming that a bank-run material is well graded and that it contains approximately twice as much gravel as sand, the voids between the particles will be nearly one-half of the total volume, and the 6 cu. ft. of bank-run material would separate into 3 cu. ft. of sand and 6 cu. ft. of gravel.

If one sack of cement is added to 6 cu. ft. of bank-run gravel, the cement will be lost in the large amount of voids between the particles, the resulting concrete being 6 cu. ft., or the volume of the bank-run gravel. In one case there will be slightly over 4 cu. ft. of concrete containing one sack of cement and in the other case 6 cu. ft. of concrete with a like amount of cement, which means that the latter is a much leaner or weaker mixture. In addition, the excess of sand contained in the bank-run material will further weaken that concrete.

A 1:4 mixture of cement and bank-run gravel may produce a volume of concrete equivalent to that of a 1:2:4 mix, but the resulting concrete will be weaker because of an excess of sand, even though the material may be clean. If the bank-run material contains twice as much sand as gravel, it will require practically a 1:2½ mixture to equal the strength of the ordinary 1:2:4 mixture, since the proportions of the materials mixed with water must be the same. The volume of concrete secured from the same amount of cement would be reduced 40 per cent.

RAILWAY TUNNELING IN THE PYRENEES.—Despatches from Foix (Department of Arriège) state that the piercing of the tunnel under the Pyrenees at Puymorens was completed on December 31 under excellent conditions. The tunnel will be on the new line from Paris to Barcelona, via Toulouse.

ADVANTAGE OF A POWER LINE FOR ELECTRIC SIGNALS.—In the vicinity of Kansas City it has been found expedient to use alternating current for electric signals in order to prevent excessive damage to the apparatus by floods. In former times occasional overflows of the river ruined the batteries and caused great damage to relays and other delicate machinery. With alternating current, however, the batteries and their containers are eliminated; and all working parts, and those liable to damage, can be placed at the top of the signal post, out of reach of the highest flood.—W. H. ARKENBURGH, in *The Signal Engineer*.

Relations of the Section Foreman and the Public

Two Discussions of a Field Now Largely Neglected
for the Cultivation of Favorable Public Sentiment

The railways are coming to an increasing realization of the importance of educating the public regarding the problems now confronting them and considerable attention has been devoted to this subject during the past few years. The two papers published below call attention to one possible factor in this work which has been overlooked to a large extent.

THE SECTION FOREMAN A REPRESENTATIVE OF THE RAILROAD

By J. T. BOWSER

Maintenance of Way Department, Queen & Crescent Route, Danville, Ky.

The local agent is usually spoken of as the representative of the railroad in the majority of its dealings with the public and, while the importance of the right attitude on the part of the agent is acknowledged, we should not overlook the importance of the right attitude of the section foreman as well. The latter employee is seldom considered except in connection with the maintenance of track or similar duties, yet he is in daily touch with many people whom the agent sees perhaps not oftener than once or twice a year, and his relations with these people, farmers in the main, often take on an intimacy that is closely akin to the neighborliness that is found among the farmers themselves. While mowing the right of way, the foreman borrows an extra scythe while the farmer borrows an extra pick or shovel, and numberless other small accommodations are exchanged. With the right attitude on the part of the foreman, the railroad becomes an agreeable neighbor instead of a "greedy corporation" to be "held up" on every opportunity.

The right of way fence should be kept in good condition by the foreman, or if it is too large a job for him to handle he should report it to the proper authority and so advise the property owner. Should the local law divide the responsibility for the maintenance of the fence, the foreman should, on advice from the office, explain this to the property owner.

If the foreman's relations with the owners of adjoining property are what they should be, he can often succeed in getting the farmer to plow fire guards to prevent the spread of fire in dry weather. If he has succeeded in making the railroad the right sort of a neighbor he has largely counteracted the spirit of "let it burn, the railroad will have to pay me a good price for it." As the first investigator of fire and stock claims, the foreman's relation with the claimant will have no little influence on the attitude of the claimant or the reasonableness of the claim.

A tactful foreman may often succeed in impressing the man who is careless about allowing his stock to get on the right of way with the fact that, though the railroad may reimburse him for his loss, there is still a loss to the community at large through the fact that this particular animal has served no useful purpose, and further, that such carelessness endangers the lives of the traveling public and the property of the railroad.

The matter of drainage is also a very fruitful source of complaint and even of legal controversy. In the construction and maintenance of a railroad it is of course necessary for drainage to be diverted from its natural channel in many cases. In the course of maintenance, the foreman should scrupulously respect the rights of adjoining property owners when he is ditching or otherwise disposing of water from the right of way, and in cases where the diversion of drainage onto adjoining property is absolutely necessary, he should, if possible, secure the permission of the owner, or failing in this, report the matter to his superior officer.

Foremen should endeavor to keep the right of way clear of weeds of a character harmful to the adjoining farm or

pasture lands. Though the right of way may not be injured thereby, it is an injustice to the adjoining property holder. It is often good policy, if rules permit, to allow the farmers to remove old ties released from the track from the right of way. These are of no value to the company, but are of considerable value to families, more especially in sparsely timbered country. For this privilege there are other privileges which the foreman is often obliged to ask in return, such as drinking water for the gang when a supply on the right of way is not convenient.

The right sort of an acquaintance among shippers or others using the station grounds at small stations will be of material assistance in keeping these grounds free from trash, etc. Proper respect for private property should be required of men in the gang at all times. The animosity of neighbors is often incurred by untoward acts on the part of rowdies among track laborers. The foreman should be allowed considerable latitude in his dealings with the farmers, as it will increase his loyalty and self-respect, and an interchange of courtesies will create a spirit of fairness toward the railroad, which is badly needed in public sentiment.

THE SECTION FOREMAN AND THE PUBLIC

By W. E. SCHOTT

Section Foreman, Southern Pacific, Benson, Ariz.

Like any other business enterprise, the financial success of a railroad system depends upon the volume of patronage it receives from its respective customers. To get as much business as possible, large amounts of money have been expended by our railroads for advertising purposes and for a force of commercial agents; sales men, to bring the respective advantages of each road before its customers, the general public; but only during late years steps have been taken to induce railway employees in different departments to secure customers for their roads.

The intelligent section foreman has many chances to make customers and what is infinitely more to the point, to make friends for the railroad which employs him. The territory, which he controls, is a narrow strip of land from 100 to 200 ft. wide and from 5 to 10 miles long. Sometimes along this stretch of ground he can be found every day in the year, working his small crew of laborers. All around him, joining the right-of-way fence on both sides, live his neighbors, the farmer and the rancher, and incidentally the railroad's patrons.

If he has been on his particular section for any length of time and is not a confirmed grouch, he knows every one of these men personally and many intimately. Hardly a day passes without his meeting or speaking to one of them. Often one of his neighbors has a job on hand which he cannot handle without a little help, such as pushing a wagon out of a mudhole and the foreman and his crew are asked for a minute's assistance; now and then the foreman takes a few rotten ties out of the track which, while useless for the railroad, are accepted gladly by the farmer for stove wood. In fact, there are a thousand occasions where the foreman can extend little favors to his neighbors which are highly appreciated by them and which are bound to create a neighborly, friendly feeling between the section foreman and the people along the line. By impressing upon them the fact that those favors are really given by the railroad, the foreman can aid considerably in having this friendly feeling also extended towards the railroad company.

Being a working man himself, just like the farmer or ranchman, the foreman's advice and counsel in matters concerning the railroad will always be accepted with more trust and confidence than anybody's else.

Nine times out of ten when the settler along the right of way

has some real or imagined grievance against the railroad, the section foreman is the first one to whom he will come for advice. He is the nearest representative of the railroad, and knowing him as a good friend and neighbor for many years, he has no doubt but that the foreman will give him his unprejudiced opinion as to whether he has a real complaint or not, or whether he will gain anything by making such kick.

Many small damage suits, perhaps not very important individually, but forming quite an item in the aggregate, have been settled by the section foreman convincing the irate farmer of the unfairness of his demand. Perhaps his argument was not quite as strong from a technical standpoint as the one the company's counsel or claim agent would have made; but as he was a fellow toiler and had proven a good friend, his argument carried far more weight than any word any high-priced lawyer, representing the road, could have said.

Another possibility of immense value to his railroad lies in the foreman's power to change to some extent public opinion towards corporations. Unfortunately, relations between the general public and the railways are not always friendly, and in consequence laws have been passed which hamper the railroads enormously, without being of great advantage to anybody. There is no question but that some of these laws have been passed on account of the antagonism for the railroads; and more will be passed if the railroads do not exert their utmost to change such public sentiment.

The best and about the only way to do this is through the employees. None of them has a better chance to accomplish something worth while in this line than the section foreman, who is in daily intercourse with a certain portion of the public.

VANADIUM STEEL RAILS FOR THE D. L. & W.

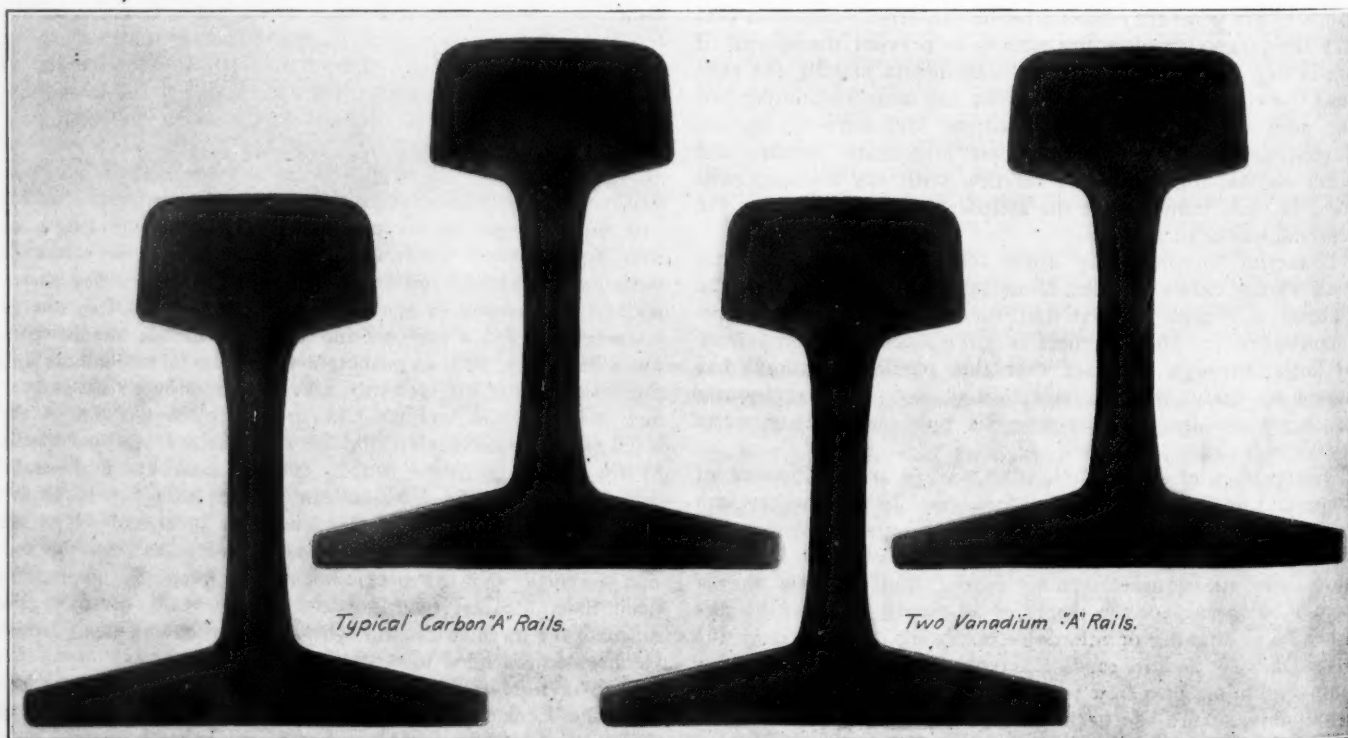
Two 100-ton heats of vanadium steel rails were recently rolled by the Pennsylvania Steel Company for the Delaware, Lackawanna & Western. These rails were of the road's standard 105-lb. section with the same chemical composition that is used in the carbon basic open-hearth rails except for the addition of vanadium and the reduction of 0.10 per cent. to 0.15 per cent in carbon. The only requirement in the road's specifications as to chemical composition is that the phosphorus content must be less

than 0.04 per cent. Two typical open-hearth heats rolled at the same time showed the following average composition: Carbon, 0.65 per cent; manganese 0.66 per cent; nickel, 0.45 per cent; phosphorus, 0.020 per cent; sulphur, 0.057 per cent; chrome, 0.24 per cent, and silicon, 0.14 per cent. The corresponding chemical contents of the two vanadium heats were: Carbon, 0.52 per cent; manganese, 0.70 per cent; nickel, 0.41 per cent; phosphorus, 0.012 per cent; sulphur, 0.056 per cent; chrome, 0.19 per cent; silicon, 0.11 per cent, and vanadium, 0.150 per cent.

The vanadium rails were required to meet the same drop test requirements as to deflection and ductility prescribed for the standard D. L. & W. rails, which limit the deflection for the first blow to a minimum of 0.85 in., and a maximum of 1.30 in. The minimum deflection in the six vanadium rails tested was 0.88 in., and the maximum 1.08, the average being 1.00 in., as compared with a minimum of 1.00 in., a maximum of 1.08 in., and an average of 1.04 in., for the carbon open-hearth heats. In elongation under the drop test three of the six vanadium rails tested met the specifications under the first drop and the other three under the second drop, while none of the carbon rails met it under the first drop.

In the tensile test the two vanadium heats showed an elastic limit of 85,800 lb. per sq. in., as compared with 60,437 lb. for the two carbon heats and a tensile strength of 139,280 lb. per sq. in., as compared with 132,032 lb. per sq. in. The average elongation in 2 in. was 10.5 per cent for the vanadium and 10.4 per cent for the carbon heats and the reduction of area 18.0 per cent and 17.7 per cent, respectively. The vanadium rails also showed greater hardness, the average Brinnell number for the vanadium test being 297 and for the carbon 274. In brief, then, the vanadium rails showed in the tests an increased strength and hardness with approximately the same deflection under the first blow of the drop test and a slightly better ductility.

ACCIDENTS TO TRACKMEN.—As a result of the safety campaign on the Chicago & North Western the number of trackmen killed was reduced from 21 in the year 1910 to 17 in 1914 and the number injured from 1,777 to 1,203. During this period the mileage of line operated by the company has increased from 7,650 to 8,000.



Etched Cross Sections of Two Carbon and Two Vanadium Rails Showing Segregation

THE ESSENTIAL ELEMENTS IN THE DESIGN OF SWITCH CONNECTIONS

By W. F. RENCH

Supervisor, Pennsylvania Railroad, Perryville, Md.

The design of switch connections embraces the determination of two distinct questions: First, the number of frog best adapted to the space available and the service required; and, second, the length of switch most suitable for use with the selected number of frog. The former is largely an operating question, while the latter can only be decided by a close analytical study of the mathematical functions. A purely theoretical consideration of the physical question indicates that the ideal relation exists when the switch angle is no greater than one-fourth the frog angle. But experience has shown that quite satisfactory results are obtained when this ratio is as low as 1 to $3\frac{1}{2}$. It is readily seen that any increase in the length of switch employed with a particular frog tends to increase the degree of curve of the turnout, and it is this fact mainly which restricts the choice of length.

use of these numbers it is plain that the adoption of a common length of switch for all is exceedingly desirable. Since each is of frequent occurrence in main tracks the ability to cover all by a single length of switch is of unquestionable advantage.

The determination of the proper length of switch for use with this group concerns particularly the No. 6. This number must sometimes be used for main track connections, through which road power, including the modern types of passenger locomotives, operates not only in drill service, but quite often in main line movement. Practice permits the employment of any length of switch between 10 ft. and 18 ft. with this number of frogs, but the 10 ft. length introduces a too abrupt change in direction for comfortable operation in passenger service and causes a very considerable shock with consequent wear upon the point in the case of drill movement. On the other hand, while the 18-ft. length supplies the requisite improvement in the detour feature, the degree of curve is increased nearly 10 per cent, and the minimum thus created becomes somewhat precarious for road movement.

A reference to the table shows that the use of a 15-ft. length does not unduly increase the degree of curvature, while the

TABLE OF TURNOUT DIMENSIONS

Frog	Frog angle	Switch	Switch angle	Lead	Lead rail	Turnout arc	Radius	Degree	Middle ordinate
4	14° 15'	10'	2° 41'	37' 00"	20' 00"	20' 3"	98'	58° 28'	6"
5	11° 25'	10'	2° 41'	42' 00"	25' 00"	25' 2½"	162'	35° 22'	6"
6	9° 32'	10'	2° 41'	47' 00"	30' 00"	30' 2"	250'	22° 55'	5½"
6	9° 32'	15'	1° 47'	54' 00"	32' 00"	32' 2"	237'	24° 00'	6½"
7	8° 10'	15'	1° 47'	59' 5½"	37' 5½"	37' 6¾"	337'	17° 00'	6½"
8	7° 09'	15'	1° 47'	66' 11¾"	44' 11¾"	45' 0¾"	480'	11° 54'	6½"
9	6° 22'	15'	1° 47'	72' 00"	50' 00"	50' 1¼"	626'	9° 09'	6½"
6	9° 32'	18'	1° 30'	57' 00"	32' 00"	32' 2"	227'	25° 14'	6½"
7	8° 10'	18'	1° 30'	62' 8½"	38' 8½"	38' 10"	332'	17° 16'	6½"
8	7° 09'	18'	1° 30'	69' 11¾"	44' 11¾"	45' 0¾"	455'	12° 36'	6½"
9	6° 22'	18'	1° 30'	75' 00"	50' 00"	50' 1¼"	588'	9° 45'	6½"
10	5° 44'	18'	1° 30'	80' 00"	55' 00"	55' 1¼"	744'	7° 42'	6"
11	5° 12'	18'	1° 30'	85' 00"	60' 00"	60' 1"	928'	6° 10'	6"
12	4° 46'	18'	1° 30'	91' 00"	66' 00"	66' 1"	1,158'	4° 57'	5½"
10	5° 44'	24'	1° 07'	88' 6"	57' 6"	57' 7½"	714'	8° 01'	6½"
11	5° 12'	24'	1° 07'	94' 00"	63' 00"	63' 1"	900'	6° 22'	6½"
12	4° 46'	24'	1° 07'	98' 5½"	67' 5½"	67' 6¾"	1,075'	5° 20'	6½"
15	3° 49'	24'	1° 07'	119' 6"	87' 6"	87' 6¾"	1,858'	3° 05'	6"
16	3° 35'	24'	1° 07'	125' 0"	93' 0"	93' 0¾"	2,149'	2° 40'	6"
12	4° 46'	30'	0° 54'	108' 6½"	71' 5½"	71' 6½"	1,058'	5° 25'	7½"
15	3° 49'	30'	0° 54'	128' 00"	90' 00"	90' 0¾"	1,767'	3° 15'	6½"
16	3° 35'	30'	0° 54'	134' 00"	96' 00"	96' 0¾"	2,049'	2° 48'	6½"
20	2° 52'	30'	0° 54'	156' 00"	118' 00"	118' 0½"	3,490'	1° 40'	6½"
24	2° 23'	30'	0° 54'	185' 00"	145' 00"	145' 0½"	5,600'	1° 01'	5½"

In the table of the principal functions for various combinations the lead has been modified within practical limits from the strictly theoretical dimension, with a view to the use of commercial lengths, in the main rail, assuming these to be generally 25 ft., 27 ft. 6 in., 30 ft., and 33 ft., or where this is not practicable, of such lengths cut in two in the proportions necessary to make the difference between the main rail and the turnout arc. This difference follows a regular ratio and is obtained in every case by dividing 12 in. by the number of the connection, which it should be noted is not always that of the frog employed, but is the one which most nearly corresponds with the resultant curvature.

By the uses to which they are applied connections are divided into four general classes, viz.: siding connections; main track and siding connections for low speed; main track connections for medium restricted speed, and main track connections for the greatest practicable restricted speed.

Connections which are exclusively of the first class consist of those over which road power cannot operate, and they are therefore less than No. 6. Because of the menace to passenger traffic such frogs should be rigidly excluded from main tracks carrying passenger traffic. The typical frog of this class is the No. 5, which average practice fixes as the lowest number that will satisfy the requirements of the safety appliance law. It requires no demonstration to show that the proper length of switch to be used with this number of frog is 10 ft. In fact, it is generally recognized that this length of switch is the minimum that may be employed with any connection.

The second classification includes by far the largest percentage of all the frogs that are in use on American railways, embracing those between Nos. 6 and 9. Bearing in mind the general

switch angle is reduced one-third. This length of switch therefore appears to be more generally desirable for the No. 6 frog than either of the other lengths. It will also be seen that in the case of the No. 7 an equal curvature to that with an 18-ft. switch results and that the curvature of the No. 8 and No. 9 with the 15-ft. switch is materially less than that obtaining with the 18-ft. switch. The middle ordinate of the chord of the turnout arc is uniformly 6¼ in., which practically may be used as 6 in. with 4½ in. at the quarters. Thus exact line may be obtained readily, which is an essential feature in switch construction. This length is therefore recommended as one of the standard lengths in preference to 18 ft.

The one objection is that this length is not desirable with the No. 10 frog, which is in very common use on many roads, but this turnout more properly belongs with the class of main line turnouts through which a medium restricted speed is not only safe but comfortable, and a longer switch even than 18 ft. is desirable. It will be observed upon reference to the table that the use of a 24-ft. switch with a No. 10 frog but slightly increases the curvature above that which obtains with the 18-ft. switch, while the detour feature is again one-third improved. This also applies to the No. 11 and No. 12 frogs, which are often employed in preference to the No. 10 when space for the No. 15 is lacking. The 24-ft. length is quite favorable for the No. 15 and No. 16 frogs, and in all of these the middle ordinate is seen to be very close to 6 in.

There still remains the fourth class wherein detour must be made at the greatest speed practicable, both as a means of maintaining headway and of avoiding loss of time while passing through the connection. The former is the more important consideration, as headway once lost usually requires a dozen miles

to regain, and if adverse grade is present it may require a much greater distance. It will be conceded that a conservative limit for the unbalanced elevation of a curve is $1\frac{1}{2}$ in. This fact considered alone would permit the operation of No. 20 and No. 24 connections, whether of turnouts or crossovers, at a speed of 45 miles per hour. But it is neither comfortable nor entirely safe to detour through the angle made by a 30-ft. switch at a speed faster than 30 miles per hour, unless the alinement through the switch is adjusted to furnish equal advantage to the main track and the turnout routes, which would, of course, require that the speed through both routes should be restricted alike, when a speed of 45 miles per hour would be entirely proper.

It is recognized that the 18-ft. switch is extensively used and by many of our best roads, and that it covers a very wide range of numbers viz.: between No. 6 and No. 12. But it has been shown that neither the 10-ft. nor the 18-ft. switch is desirable with the No. 6 frog, and, similarly, neither the 18-ft. nor the 30-ft. length is adapted to the No. 12 frog. While the 18-ft. length is quite satisfactory with the No. 10 frog as regards curvature, it is not easy enough in the detour feature to fully meet the needs of this number in main line movement. The fact that by its use the number of working lengths may be kept at three with a saving in stock account has heretofore justified its use. But the increase in the size of both passenger and freight power warrants the revision of standards to meet the new conditions, even though the fourth length be introduced.

The choice of stock numbers of frogs will probably always be a matter of individual preference, but a study of some of the practical considerations in such a selection may be of interest. The No. 5 frog will be used where only drill power operates. If the drilling must be done by road power the No. 6 should be the minimum permissible. This number is almost invariably chosen for wye tracks, not alone because of the considerably less room required, but also because the shorter length can be traversed in less time, an important item at terminal points. But it is desirable on account of the natural shifting of the track beyond the connection that the general radius be no less than 300 ft.

The No. 8 frog is the most frequently used of the group of smaller numbers. It is a common selection for main track connections with private industry tracks, with set-off sidings for crippled cars, and especially for yard ladders. The feature that renders it desirable for this last purpose is the fact that it is the lowest number that can be used at 15 miles per hour, and thus the greatest conservation of room will obtain without sacrifice of celerity in operation.

Nos. 10, 11 and 12 frogs are preferred for main track crossovers where moderate speed only is required, not alone because they are safer if greater speed than the established limit should be used, but because they encroach less upon the clearance with the traffic running upon adjoining tracks, an important consideration with 12-ft. centers of tracks. The Nos. 15 and 16 frogs are very useful where space is limited and it is desirable to make movements with speed, or where a fair degree of headway must be maintained. The No. 20 and higher frogs are preferable where ample space is available and the highest speed practicable must be used.

The numbers from No. 15 are not infrequently very useful to render the curvature favorable when the turnout springs from the inside of a sharp curve, and, similarly, the No. 10 and No. 12 frogs supply the needed operating advantages of the higher numbers when the turnout is from the outside of a curve.

The question of what numbers will best serve the uses of a trunk line railroad can be readily determined from the foregoing discussion. These will be found to be Nos. 5, 6, 8, 11, 15 and 20. It will be noted that these numbers increase in a regular progression and that in a general way the curvature of all except the second number is just twice that of the next lower number. The suggested numbers will be found to supply a regularly increasing length for crossovers, and they thus furnish the means for economical use of the space available. The No.

15 and No. 20 turnouts, which are much used in interlocking layouts, employ rails that vary 5 ft. in length and thus supply the required spacing for insulated joints without the introduction of unusual lengths.

The use of the 10-ft. length with the No. 5, of the 15-ft. length with the No. 6 and No. 8, of the 24-ft. length, with the No. 11 and No. 15, and of the 30-ft. length with the No. 20, all give a uniform middle ordinate of practically 6 in. for the chord of the turnout arc. This feature supplies the opportunity for general use of a uniform rule in lining the turnout curve, which is of very considerable advantage. It is well known that even on main line divisions poor line through the turnout arc is quite common, and this defect may be traced to the practice of lining the curve by eye or what is almost equally unsatisfactory, by a system of offset measurements. In the rush of lining such connections the simpler the process the better the result obtained.

The approximate speed in miles per hour that may be used through connections, assuming that the curvature is at least 100 per cent greater than will just pass the power in question, is about double the frog number, and it will thus be seen that the numbers recommended furnish a regular progression in this respect also.

The ultimate supplanting of the No. 10 by the No. 11 is inevitable, because in the case of crossovers, which is their most common use, the length is increased but 15 feet, while a 25 per cent lighter curvature obtains.

STANDARD METHODS OF PILING AND MARKING TIES ON THE PENNSYLVANIA

The Pennsylvania Railroad has given special attention to the best methods of piling ties previous to inspection and purchase and also when stored along the line awaiting insertion in the tracks, to reduce the decay to the minimum. Special methods have also been devised for the marking of ties to maintain their identification as regards kind of wood.

Sketches have been prepared showing the approved and improper methods of piling ties, copies of which have been sent to the foremen along the line. Efforts have also been made to get the tie producers to pile the ties for inspection in accordance with these standards. To this end the inspectors have

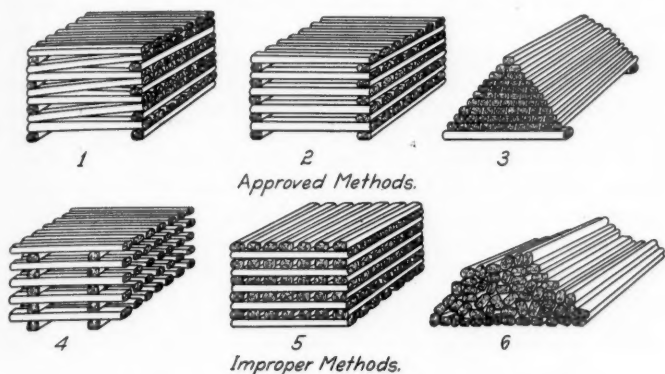
Used without Preservative Treatment.					Used after Preservative Treatment.				
Kind of Wood.	Symbol	Grade 1	Grade 2	Grade 3	Kind of Wood.	Symbol	Grade 1	Grade 2	Grade 3
White Oak					Red Oak				
Black Locust					Honey Locust				
Black Walnut					Hickory				
Black Cherry					Beech				
Chestnut					Hard Maple				
Sassafras					Sycamore				
Red Mulberry					Red Gum				
					Hackberry				
					Ash				
Heart Pine					Soft Maple				
					Black Gum				
					Butternut				
					Birch				
					Elm				
Cypress					Sap Pine				

Methods of Marking Ties with Hammer Brands

been supplied with small cards, showing the approved method of piling the ties, to distribute among the tie producers, while the purchasing department has added this information to its price circular. The results secured in this direction have been quite satisfactory.

As shown in one of the accompanying sketches, pile No. 1 shows the recommended method for stacking any kind of wood while awaiting use or treatment. In this way the ties rest on the edges only, and thus have the least area of contact, and this area is close to the end where the final stresses in the tie are the least. Pile No. 2 shows the method which is permissible for the stacking of ties to be inspected. While with this method

the ties have a flat contact, the weight is applied at the ends where it retards checking, and even if the contact results in decay the minimum amount of harm is done. In this respect this method differs from that shown in pile 4, where checking



Correct and Wrong Methods of Piling Ties

may extend as far as the rail seat and decay or "pile burning" may also start at the rail seat or the point of greatest stress. These differences between piles 2 and 4 have not always been realized by the foremen or tie producers, and special efforts have been made to instruct them in this regard.

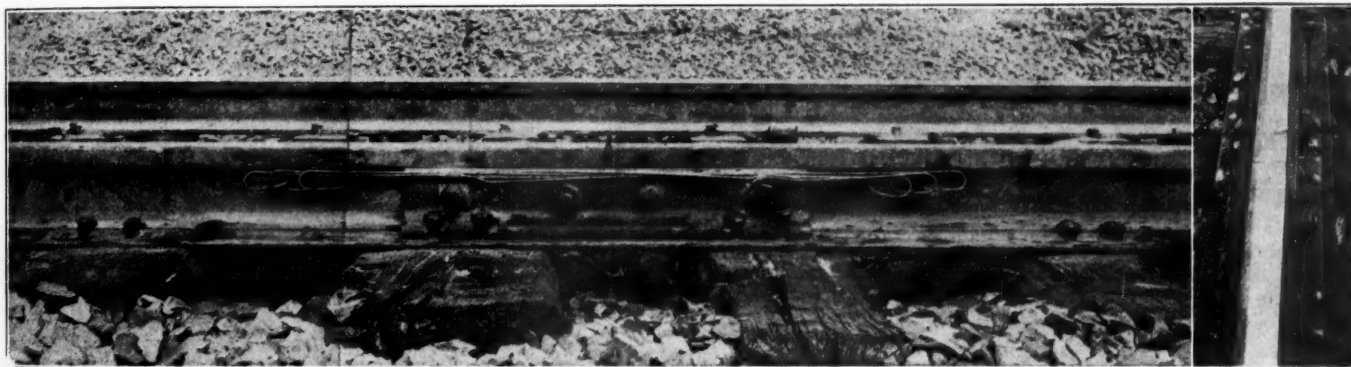
Pile No. 3 shows the improved method of stacking creosoted and heart pine ties at right angles to the track when within

quire that all inflammable vegetation be removed for at least a foot around each pile and where any quantity of ties are stored on an area surrounded by grass or timber a fire line is plowed around them at least 100 ft. from any adjoining structure.

The standard system of marking ties accepted by the inspectors is shown in Fig. 2. Previous to July 1, 1914, the distinctions as to kinds were indicated by paint, but on this date symbols were added to the hammers which formerly branded only "P. R. R." and the inspector's number on each tie. The advantages of the new system are that it is cheaper, it saves the clothes and lightens the equipment of the inspector, it is quicker to apply and it enables all kinds of wood to be distinguished permanently, whereas the various colors of paint looked alike after the ties came out of the creosoting cylinder. All class-A ties or those which are to be inserted in the track without treatment are marked with characters composed of curved lines. Class-B ties, which are used only after treatment, are indicated by symbols composed of straight lines. In this way all that the track laborers have to remember is that ties with straight lines are not to be used in the track except when black, showing that they have been creosoted.

NEW PENNSYLVANIA STANDARD ANTI-CREEPING TIE PLATE

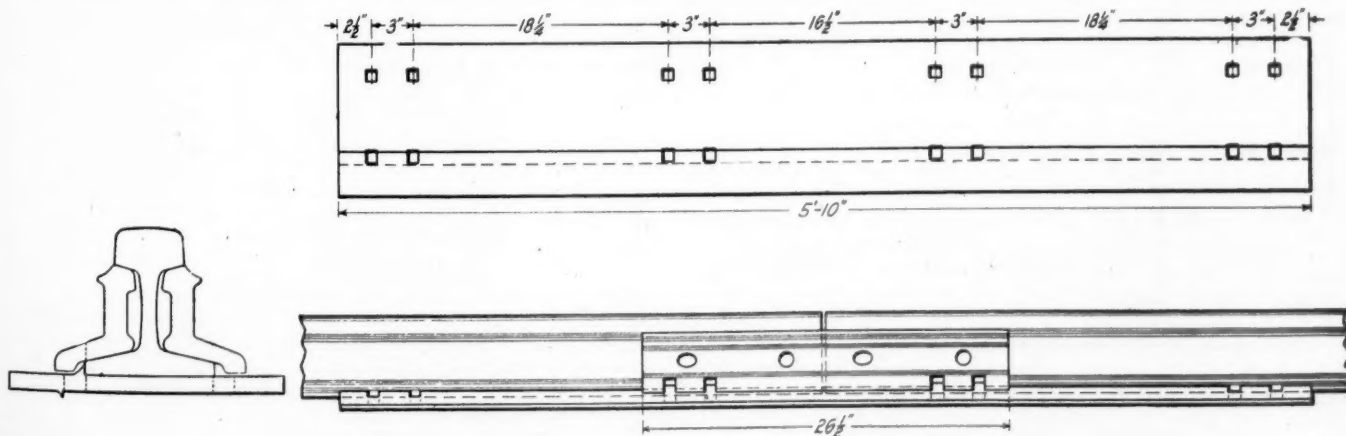
The Pennsylvania Railroad has adopted as standard for 100-lb. rail a joint tie plate 5 ft. 10 in. long extending over four ties. This plate, which is 10½ in. wide and ⅞ in. thick, is used with



A Side and Top View of the Pennsylvania's New Anti-Creeping Tie Plate Extending Over Four Ties

reach of locomotive sparks. When beyond the reach of sparks, creosoted and heart pine ties are stacked solidly, 10 ties to the layer. Only creosoted or rejected ties are placed on the ground

the plain angle bar joint. It is slotted to correspond with this standard angle bar and also for double-siking to the two ties beyond the angle bar. The details of the plate are shown in the



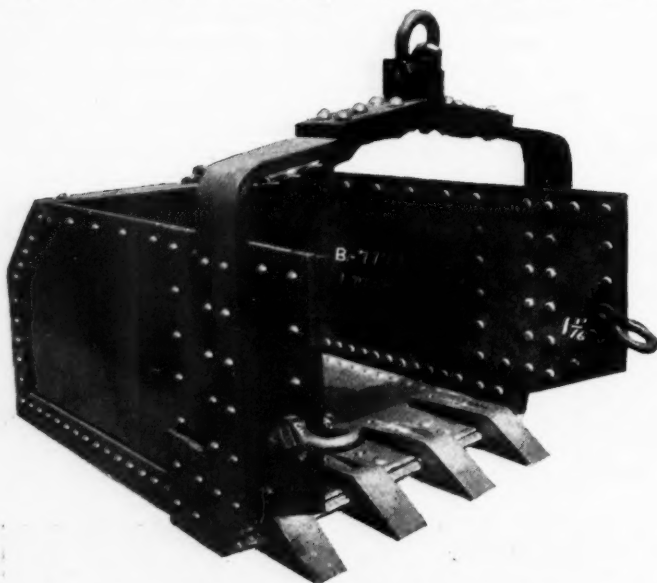
Details of Pennsylvania's Joint Tie Plate Used Under 100-lb. Rail

under the piles. All untreated ties are piled with an open side toward the prevailing wind, while only creosoted and heart pine ties are allowed to be piled solidly. The instructions re-

accompanying photographs and drawing. This plate not only gives a strong rail joint, but has also proved an excellent anti-creeper.

A CABLEWAY COALING STATION

A new type of coaling station having special advantages for points where it is necessary to store coal frequently, has been designed by Sauerman Brothers, Chicago, utilizing the Shearer & Mayer drag line cableway and bucket for which this firm is the agent. The station consists of a coal receiving hopper alongside a coal storage pit, a coal pocket with overhead bins and proper facilities for discharging the coal into locomotive tenders, and the overhead cableway with the mast and anchor so



Bucket Used with Shearer & Mayer Drag Line Cableway

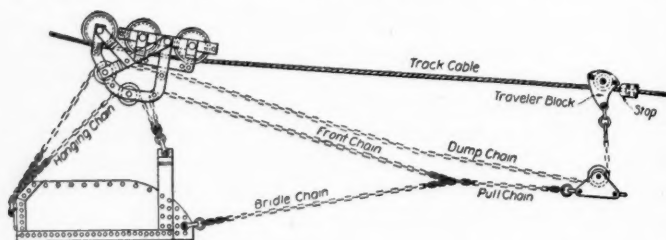
located that the bucket will travel from the receiving hopper over the storage pile to the coal pocket.

The entire plant is located between two tracks, one on which the coal is brought in and dumped into the receiving hopper and the other on which locomotives receive coal from the

picking up stored coal by a steam shovel or locomotive crane.

The drag line cableway consists of a bucket and carriage mounted on a slack track cable shown in the accompanying drawing. The track cable is supported at the power end by a mast or tower and at the opposite end by an anchorage which can be arranged to allow it to be shifted readily in order to change the line of operation of the cableway. The operating power is furnished by a double friction drum engine, the front drum controlling a steel cable called the "load" line which leads through a sheave on the mast to the bucket mounting, and the back drum controlling a tension line leading to a set of fall blocks attached to the mast. The former cable serves the double purpose of loading the bucket and pulling it along the track cable to the dumping point. The latter cable affords a means for slackening and tightening the track cable, one end of which is supported by the fall blocks.

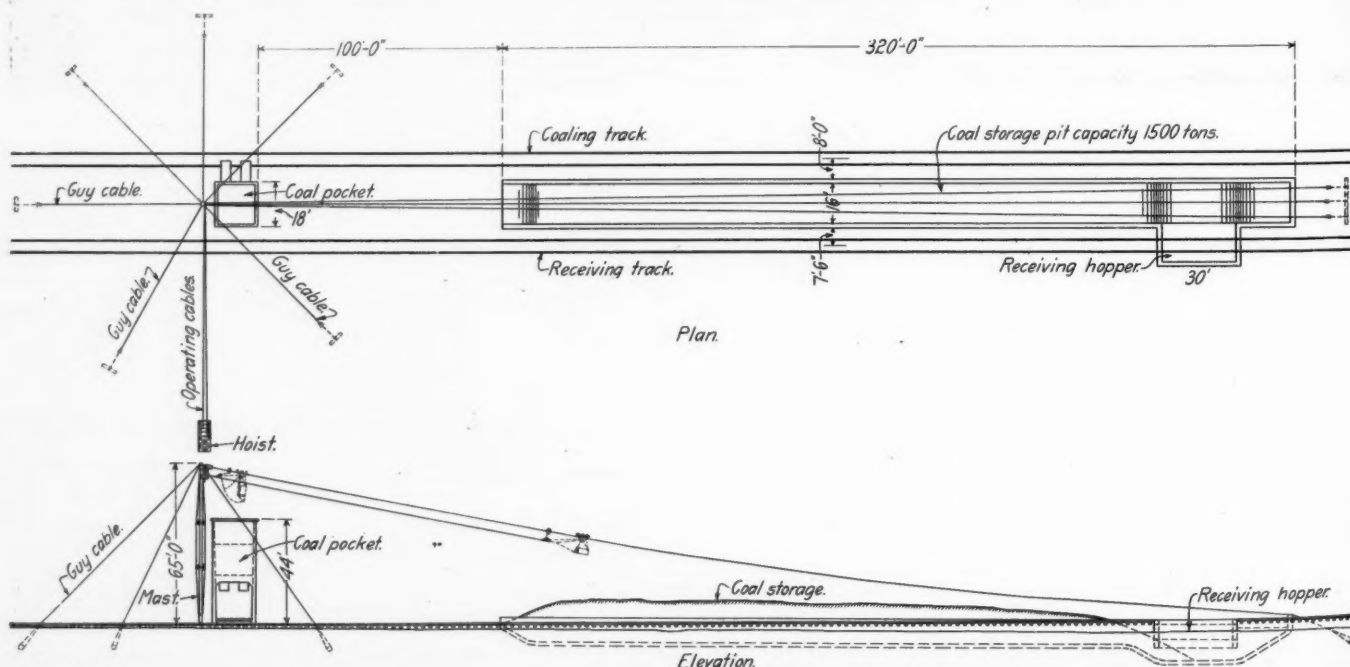
When the bucket is loading, the track cable is slack. After



Drag Line Bucket and Operating Lines Used for Handling Coal

the bucket is loaded, this track cable is gradually tightened, thus lifting the load at the same time that the load cable hauls the bucket up to the dumping point. The operation of dumping is accomplished by a stop clamp on the track cable which engages a block traveling on this cable and arrests its movement. The pull of the load line is thereby transferred from the pull chain to the dumping chain connected with the rear end of the bucket, which automatically dumps the material. After dumping, the bucket returns to the loading point by gravity.

This cableway, which is covered by patents, has been used in



Plan and Elevation of Cableway Coaling Station

pockets. Under normal operation, the coal would be taken direct from the receiving hopper to the bins in the coal pocket, but when desirable to store coal in anticipation of a shortage, it could be moved by the bucket from the hopper to the storage pile and later reclaimed from storage in the same manner, thus eliminating one handling as compared with the usual method of

gravel pits, in levee construction and general excavation work with success. A variety of materials, including coal, have been handled by the bucket shown in the accompanying illustration, the teeth of which are removable in order to secure the best results in handling various classes of material under different conditions.

General News Department

The midwinter convention of the American Institute of Electrical Engineers was held at the Engineering Societies' building, 33 West Thirty-ninth street, New York, February 17, 18 and 19. A number of prominent engineers gave addresses on "The Status of the Engineer."

F. M. Swacker, United States District Attorney at New York, is again investigating the doings of the former directors of the New York, New Haven & Hartford. It is said that all of the indictments against directors, for alleged offenses against the anti-trust law, which have been hanging over them for several months will have to be redrawn, because of some technical illegality in their preparation.

H. W. Thornton, formerly general superintendent of the Long Island Railroad, now general manager of the Great Eastern of England, has "made good." This statement came in a press despatch from London, last Saturday, saying that at the annual meeting of the shareholders of the Great Eastern, Lord Claud Hamilton, the chairman of the company, paid Mr. Thornton a special tribute; and that the meeting unanimously agreed that Mr. Thornton, already, before filling out a year's service, had fairly justified his selection as manager.

Clifford Thorne, chairman of the Iowa Railroad Commission, appeared before a joint committee of the Iowa legislature on February 5, and asked that an appropriation be made for a valuation of the railroad property in the state. He said the valuation is needed both to ascertain the reasonableness of rates and also for purposes of taxation, and that it could be made in either of two ways—by employing a few engineers to make a check of the Interstate Commerce Commission appraisal, which he said would cost \$15,000 or \$20,000, or to make a complete independent valuation, which he estimated would cost \$100,000 or \$125,000.

About 300 of the employees of the New York and Staten Island divisions of the Baltimore & Ohio held their second annual banquet and fellowship meeting at the Broadway Central hotel, New York, on the evening of Saturday, February 6. C. C. F. Bent, general superintendent of the New York division, J. M. Watkins, auditor of revenue, W. H. Averell, general superintendent of the Staten Island line, and R. M. Van Sant, editor of the Baltimore & Ohio Employees' Magazine, addressed the meeting, and C. W. Tomlinson, general eastern freight agent, read a paper on the Best Way to Obtain Efficiency in Railroad Operation.

The Pennsylvania Railroad reports that 427 fires—more than three-quarters of all that occurred on the property of the system last year—were extinguished by company employees before receiving the aid of public fire departments. The average loss was \$43. Organized fire brigades among the employees last year checked 34 fires, and other employees, by the use of chemical extinguishers, put out 71. The total fire loss on the Pennsylvania system during the year 1914, including fires where the assistance of city fire departments was received, was \$658,483, while the value of the entire property was nearly \$400,000,000, the fire loss being only 16 cents per each \$100 of property value at risk.

The recent action of the Oregon Wool Growers' Association in adopting resolutions at its annual meeting appealing "to our national and state legislators and officials, and to our own membership and the general public, to adopt an attitude of encouragement towards transportation, public utility and business enterprises, to urge the repeal of legislation which, though exalted in purpose, has proved destructive in effect, and to support legislation that will foster the investment of capital, stimulate industry and increase material prosperity, so there will be better markets for our products, more profit for the producers and more employment and better wages for labor," has been followed by similar action by two other influential organizations in that state. Resolutions of a similar tenor indicating a new attitude towards business have just been adopted by the Oregon Irriga-

tion Congress, one of the strongest associations of farmers in the state of Oregon, and by the Oregon Pure Bred Livestock Association.

The Pennsylvania reports that of 3,861,962 efficiency tests and observations made last year, more than 99.9 per cent showed perfect obedience to the rules. In other words, regulations were followed to the letter 1,494 times in every 1,495 cases observed. In the observance of stop signals, 24,798 tests were made, and in only 34 cases was there failure to live up to the strict letter of the rule. An absolutely perfect record was made by engineers in observing flagmen's signals; 18,203 tests showed not one failure. In 113,747 instances observed, there were only 314 in which the rules governing the handling of explosives and inflammables were not followed exactly. In all save nine out of 16,251 cases, the rule requiring trainmen to be stationed at all unprotected grade crossings, during the shifting of cars, was obeyed. There were only 17 infractions, in 53,430 instances, of the rules governing watchmen at protected crossings. Out of 17,642 observations to see whether first aid equipment was kept in proper order, six cases requiring criticism were found.

The New York Central reports that during the last year the number of surprise tests made on its lines was 323,292, and the number of cases of inefficiency was 389, showing a percentage of efficiency of 99.88. To the report of safety on this road, for the year ending June 30, 1914, which was given in the *Railway Age Gazette* last week, may be added the statement that no passenger has been killed in a train accident on that road during the past four years.

Employees of the St. Louis & San Francisco, who held a mass meeting at Springfield, Mo., on February 7, to begin a campaign for higher freight and passenger rates in Missouri, have appointed an executive committee and sub-committees for each 100 miles of road in the state, to circulate petitions. The executive committee has issued a statement to the press stating that there are more than 26,000 idle laboring men in the state of Missouri at the present time, and that this is because the railroad rates are so low that they are unable to earn the money to buy material and employ the labor necessary to keep up a safe and efficient condition of the roadbed, rolling stock and machinery. It is stated also that in the United States at the present time there are 1,450,000 laboring men idle for this reason, and over 1,500,000 who are working on short time. The earnings decreased from 33 1/3 to 50 per cent per month. This means, the statement says, that this vast number of employees is in a position where they must retrench and purchase less of the goods from the retail merchants of the cities in which they reside.

Report on Lackawanna Derailment Near Alford, Pa.

The Interstate Commerce Commission has just issued a report on the derailment of the Delaware, Lackawanna & Western passenger train No. 32 near Alford, Pa., on October 31, 1914, resulting in the injury of 23 passengers and 12 employees. This train, consisting of 4 wooden coaches, was running at a speed of approximately 15 miles an hour when it was derailed by a broken rail on the inside of a 4-deg. curve. The rail was broken squarely across in six places, four of these breaks showing transverse fissures in the head. Subsequently four other fissures were found in the rail, ranging in diameter from 7/16 in. to 1 3/4 in.

Passenger train No. 14 had passed over this track about one hour previous to the accident and the engineman felt a jolt, such as would result from a broken rail. He made a special stop at Alford, two miles beyond and instructed the operator to inform the chief dispatcher of this condition. The dispatcher then instructed the operator to notify the section foreman, which was not done until about 45 minutes after the accident. The dispatcher did not notify train No. 32 of the broken rail before it left the preceding station.

In the report of the engineer-physicist on this rail it is stated

that all the transverse fissures were located on the gage side of the head or over the web of the rail. The presence of internal compression strains in the head of the rail immediately below the running surface was indicated by the head assuming a convex shape when released from the web showing a deflection of 15/16-in. in 12 ft. The report concludes by again calling attention to the increasing prevalence of transverse fissures and to their danger, showing two photographs of 78 individual rails in which transverse fissures have recently occurred.

Summary of Revenues and Expenses of Steam Roads

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for November, 1914, are as follows:

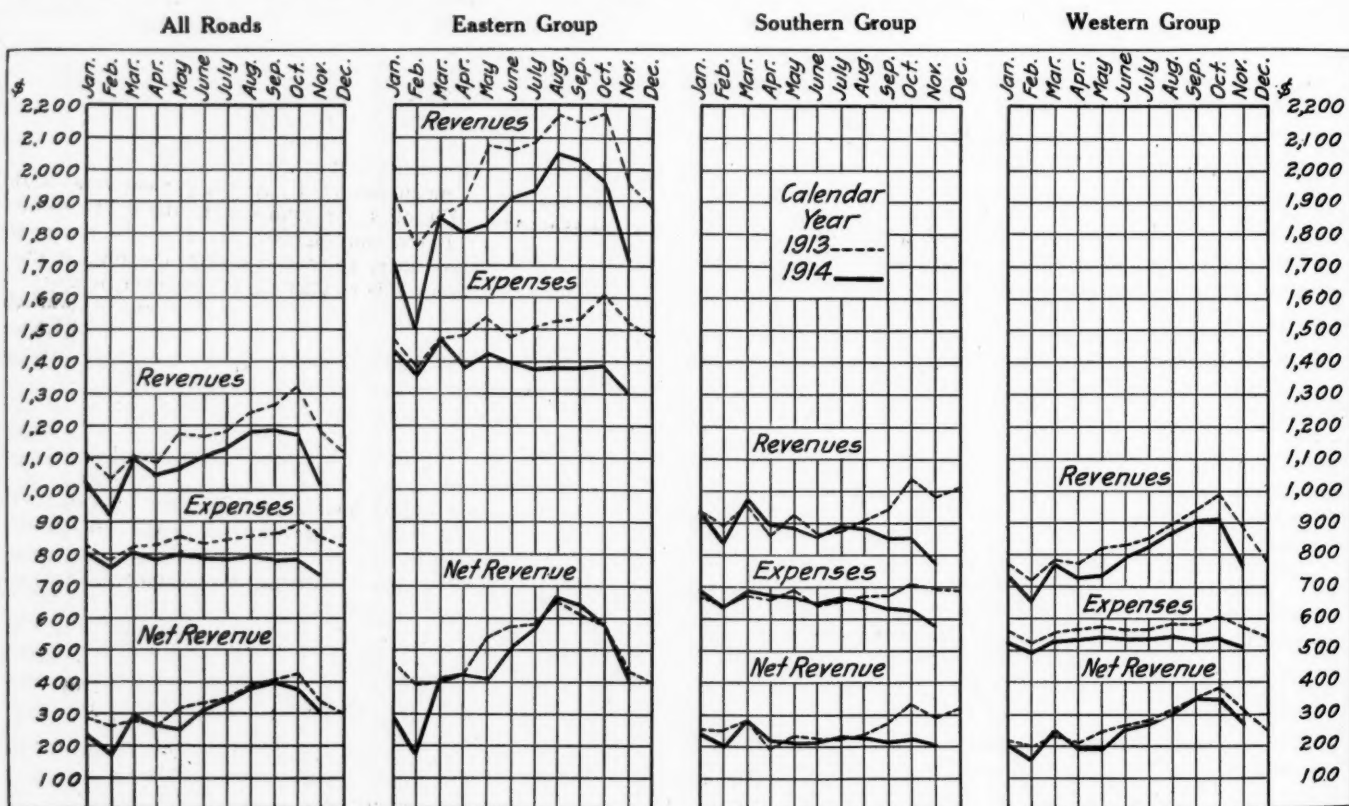
Railways operating 228,461 miles of line are covered by this summary, or about 90 per cent of all steam railway mileage in the United States. Their operating revenues for the month of November, 1914, amounted to \$233,812,430. This amount includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources connected with rail and auxiliary operations. Compared with November, 1913, these operating revenues show a decrease of \$32,836,569.

creasing \$42, or 14.7 per cent. Operating income for each mile of line for each day in November averaged \$8.08, and in November, 1913, \$9.47. Operating income is that proportion of their operating receipts which remains available to the railways for rentals, interest on bonds, appropriations for betterments, improvements, new construction, and for dividends.

The railways of the Eastern district show a decrease in total operating revenues per mile of line as compared with November, 1913, of 11.9 per cent, those of the Southern district a decrease of 19.9 per cent, and those of the Western district a decrease of 11.9 per cent.

Operating expenses per mile decreased 13.8 per cent in the East, decreased 15.2 per cent in the South, and decreased 11.3 per cent in the West. Net operating revenue per mile decreased 5.2 per cent in the East, decreased 31.0 per cent in the South, and decreased 12.9 per cent in the West. Taxes per mile show a decrease of 7.6 per cent in the East, a decrease of 2.9 per cent in the South and a decrease of 6.1 per cent in the West. Operating income per mile decreased 4.7 per cent in the East, decreased 35.2 per cent in the South, and decreased 14.0 per cent in the West.

The operating ratio for November, that is, the per cent of total



Monthly Revenues and Expenses per Mile of Line in 1914

Total operating revenues per mile averaged \$1,023 in November, 1914, and \$1,180 in November, 1913, a decrease of \$157, or 13.3 per cent.

Operating expenses, which include the cost of maintaining track and equipment, operating trains, securing traffic, and of administration, amounted to \$167,224,821. This was \$23,435,399 less than for November, 1913. These operating expenses per mile of line averaged \$732 in November, 1914, and \$844 in November, 1913, a decrease of \$112 per mile, or 13.3 per cent.

Net operating revenue, that is, total operating revenues of rail and auxiliary operations less operating expenses, amounted to \$66,587,609, which was \$9,401,170 less than for November, 1913. Net operating revenue per mile of line averaged \$292 in November, 1914, and \$336 in November, 1913, a decrease of \$45 per mile, or 13.4 per cent.

Taxes for the month of November amounted to \$11,143,626, or \$49 per mile, a decrease of 6.5 per cent from November, 1913.

Operating income, which is net revenue from rail and auxiliary operations, less uncollectible revenues and taxes, averaged \$242 per mile of line, and in November, 1913, \$284, thus de-

creasing operating revenues absorbed in operating expenses, was 71.5 per cent, which is comparable with 71.3 per cent in November, 1913, and 66.4 per cent in November, 1912. The operating ratio in the Eastern district for November was 76.1 per cent, as compared with 77.8 per cent in 1913; was 74.5 per cent in the Southern district as compared with 70.4 per cent in 1913; was 65.9 per cent in the Western district, as compared with 65.5 per cent in 1913.

Comparison of returns for five months of the current fiscal year with the corresponding months of the previous fiscal year reveals a decrease in total operating revenues per mile of 8.2 per cent, a decrease in operating expenses per mile of 9.6 per cent, and a decrease in net operating revenue per mile of 5.1 per cent.

This net operating revenue per mile increased 0.5 per cent in the East as compared with the corresponding period of the previous year, decreased 18.5 per cent in the South, and decreased 5.7 per cent in the West.

When the returns for the eleven months of the calendar year 1914 are compared with the corresponding months of 1913, they show a decrease in total operating revenues per mile of 7.3 per cent, a decrease in operating expenses per mile of 6.6 per cent,

and a decrease in net operating revenue per mile of 9.1 per cent. This net operating revenue per mile decreased 10.3 per cent in the East as compared with the corresponding period of the previous year, decreased 11.2 per cent in the South, and decreased 7.0 per cent in the West.

The diagram shows the variations in operating revenues, operating expenses, and net operating revenue per mile for the separate months of the calendar year 1913 and of the calendar year 1914 to date.

The following table shows the per cent of operating revenues consumed by such class of expenses:

	PER CENT OF TOTAL OPERATING REVENUES			
	November, 1914			
	United States	Eastern District	Southern District	Western District
Freight revenue	70.0	68.7	72.7	70.3
Passenger revenue	20.7	20.9	19.6	20.9
Mail revenue	2.0	1.7	1.9	2.4
Express revenue	2.5	2.7	2.5	2.3
All other revenues	4.8	6.0	3.3	4.1
Maint. of way and structures	12.4	12.4	13.6	12.1
Maintenance of equipment	17.4	19.2	18.9	15.0
Traffic expenses	2.1	1.9	2.8	2.1
Transportation expenses	36.5	39.3	36.0	33.8
General expenses	2.6	2.5	3.0	2.6
All other expenses	0.5	0.8	0.2	0.3
Total operating expenses	71.5	76.1	74.5	65.9

Proposed Railway Legislation

The bill before the Alabama legislature to require the use of high-power headlights on all locomotives, has been passed by the Senate, and has been favorably reported by the committee in the House.

The New Jersey Senate has passed by a vote of 11 to 7 Senator Pierce's bill, requiring the removal of one grade crossing each year by each railroad in the state, for every thirty miles of its line in the state.

There is a bill before the legislature of Ohio to make Eastern time the standard of the state, instead of Central. A number of hearings have been held and it is said that the committee in charge of the bill is divided, six to four, six being against the adoption of the proposed law. The city of Cleveland has adopted Eastern time and evidently wants the rest of the state to take the same action; but at Cincinnati there is strong objection.

Bills presented in Pennsylvania include one to require that signalmen and similar employees shall be given two days' holiday each month at full pay; one permitting railroads to issue tickets to clergymen at reduced rates; requiring all men to have one day of rest in seven; for medical inspection of employees of dining cars; allowing second class cities to tax all tracks, sidings, switches, turnouts and other facilities on highways and wharves; allowing municipalities to tax real estate of all corporations; repealing the anthracite coal tax act of 1913, now in the courts; regulating acid lubricating oil; restricting use of state police in lockouts; requiring advertisements for strike breakers to contain notice of labor disturbance; adding 116 men to the state police force, which now contains 228 men; regulating sub-leases of company houses; punishing trespassing on lands or waters of water companies; requiring all locomotives to be equipped with automatic bell ringers, and the regular biennial bill to require all locomotives to be equipped with headlights which will enable a man to be seen 600 ft. away. The bill to repeal the "full crew" law has not yet appeared, but the railroad men have organized to fight it.

Proposed Additional Accident Statistics

The new forms for use by railroads in reporting accidents to the Interstate Commerce Commission, proposed recently by the commission and noticed in the *Railway Age Gazette*, January 22, page 164, were the subject of a conference in New York City this week between the committee of the American Railway Association, Julius Kruttschnitt, chairman, and W. J. Meyers, statistician of the commission. There were present also Dr. Meeker from the Department of Labor, Washington; representatives from the state railroad commissions of New York, Pennsylvania and Illinois, and officers of two railway brotherhoods, the conductors and enginemen. It is expected that a second revision of the blanks will be made and distributed, and that therefore the

discussion of details will take no final form for several weeks yet. The committee representing the railroads has proposed a single blank, to contain all necessary spaces to make it suitable for use in recording any and all kinds of accidents which are reported to the government. Efforts will be made to secure the co-operation of all the principal roads, the state commissions and the Interstate Commerce Commission in a movement to standardize accident records, so that the primary record, that made by the railroad superintendent, can be made acceptable to all interests—the federal government, the state governments and the legal departments of the railroad companies, with the least practicable modification.

Cost of Valuation Forty-Five to Sixty Millions

Mr. Prouty, chief of the valuation division of the Interstate Commerce Commission, in a statement made before the House Appropriations Committee at Washington, recently gave some estimates of the probable cost of the work of valuing the railroads of the country, which must have made even the most "progressive" Congressmen pause for a moment.

The commission for the next fiscal year asks for \$3,000,000. The last annual appropriation was \$2,000,000 and \$400,000 had been appropriated before that. The cost of the current work now going on is about \$2,000,000 a year, of which about \$500,000, according to Mr. Prouty, is what may be called overhead expenses. He desires to carry on the field work faster than at present and therefore asks for a larger appropriation. There are now at work 40 parties, eight parties in each one of five districts. These men go over about 2,000 miles of road a month. He desires to double this rate; that is, to make it about 50,000 miles a year; and even at that it would take at least four years from next July to finish the work. At the present rate—\$2,000,000 a year for 24,000 miles, the total cost to the government for all the roads would be around \$21,000,000. Possibly, if the overhead charges do not increase in proportion, the total might be a million or two less. The smaller figure, however, is more than six times the amount of the estimates which were common when the valuation law was first discussed in Congress.

Speaking of what the railroads are doing, Mr. Prouty said that at present they were doing more talking than work; but some of them, he says, have made a good deal of progress. The Boston & Maine, at present one of the poorest of the large roads in the country, is expending on this work an average of \$100 a mile. Other roads, however, may have more complete records and very likely will not have so large an expense for new surveys. At \$100 a mile the 250,000 miles of road in the country would cost \$25,000,000.

In another part of his statement, Mr. Prouty says that the government is spending about half as much as the railroad companies. This would make the total expenditures of the railroads of the country somewhere from thirty-six to forty-two millions.

Answering questions of congressmen as to when the results will be available, Mr. Prouty could not speak very definitely. If "certain fundamental questions" as to methods of valuation could be settled, then there would be no reason why the commission could not act promptly, on the completion of the surveys. Finally, he hinted that if the commission should go into extended detail—meaning, presumably, investigations of financial history—much more time would be taken and a much larger expense incurred.

Lobbying at Harrisburg

Messrs. Rea, Voorhees, Willard and O'Donnel, representing the railroads of Pennsylvania and New Jersey have issued a statement denying charges of improper conduct in their dealings with legislatures, employees and citizens. They hear from Harrisburg that certain underhand and wrong methods are being pursued to prevent repeal of the "full-crew" law.

The statement says in part: "The railroads are not responsible. They will stoop to no such measures. Their case has been taken directly to the court of public opinion and they challenge proof of any lobby of the kind that the public understands by that word. There is none, nor will there be any."

"With that statement, we also assert the inalienable right of any and every citizen to talk with and write to his elected representatives and to impress upon them in every honest way his views, whatever they are. It is the privilege of every railroad employee to do this. The railroads have no objection."

"We are advised that trainmen have gone to legislatures and

stated that they were sent by railroads under compulsion to urge repeal of the full-crew law and to oppose certain bills before the legislature. If any railroad officer has attempted to coerce any man under him, he has acted in direct conflict with the roads' publicly announced policy. There is no thought to coerce trainmen or other railroad employees. On proof of coercive or improper methods the man or men guilty, no matter what their positions in the service, will be disciplined.

"The railroads are taking the full-crew law directly to the people. The Brotherhood of Railroad Trainmen, in a statement issued February 11, protests against this, saying: 'They intend to present the question to the public; but why is left to conjecture. The power to repeal the law is vested in the legislature. The senators and representatives in the general assembly are chosen by the people to perform such service and the constitution of the commonwealth declares that the legislative power shall be vested in a general assembly, which shall consist of a senate and House of Representatives.'

"All of this is true. What the railroads seek is to let the people know the effect of the full-crew laws. Then, as citizens, the people can inform their elected representatives what they want done. The trainmen's organization evidently fears the consensus of informed public opinion. . . . The railroads are perfectly willing to let the people, men and women of the state, determine."

A. S. M. E. Boiler Code

The boiler code committee of the American Society of Mechanical Engineers has made a final report on this subject, which has been accepted by the council. This final report is the result of the work of the original committee, of which John A. Stevens is chairman, and an advisory committee consisting of engineers representing various phases of the design, installation and operation of boilers. This advisory committee included the following representatives from the railway field: F. H. Clark, general superintendent of motive power of the Baltimore & Ohio; A. L. Humphrey, vice-president and general manager of the Westinghouse Air Brake Company; H. H. Vaughan, assistant to vice-president, Canadian Pacific Railway, and W. F. Kiesel, Jr., assistant mechanical engineer of the Pennsylvania Railroad. The code is considerably shorter than when originally brought out by the committee; and the rules laid down in it, of course, do not apply to boilers which are subject to federal inspection and control. The original committee and the advisory committee have been continued as one and will meet once a year in order to make any changes that advances in practice may make necessary. At these meetings will also be taken up any change which may seem necessary in a rule because it works unnecessary hardship on any particular class of boiler makers or users.

Society of Technical Associations' Secretaries

The first annual meeting of the Society of Technical Associations' Secretaries will be held in the Engineering Societies building, New York, on Saturday, February 27.

The business session will start at 10 a. m., followed by luncheon at the Engineers' Club at 1 p. m., and the afternoon session will start at 2:30 p. m. The afternoon session will be opened by an address by Harry D. Vought. Secretaries of a number of important societies are to be invited to open the discussion, including: Edgar Marburg, secretary of the American Society for Testing Materials; Charles Warren Hunt, secretary of the Society of Civil Engineers; George P. Conard, secretary of the Association of Transportation and Car Accounting Officers, and Calvin W. Rice, secretary of the American Society of Mechanical Engineers. It is also expected that representatives of the railroad clubs will be asked to tell how the railroad clubs and their members can be benefited by the society.

A Talk to Apprentices

On Monday evening of this week George M. Basford, chief engineer of the railroad department of Joseph T. Ryerson & Son, made an address before the apprentices of the Chicago & North Western at Chicago. The talk was intended to give the boys a bigger and broader view of the opportunities which lay before them and of the possibilities which might result if they were to follow their work in the right spirit. The title of the

address was "Making Heroes." "Choose to be heroes," said Mr. Basford, "in the heroism of simple honesty in the work which shows and in that which lies concealed, that you may look back in years that are to come proud that you have done an important part in making the Chicago & North Western a better railroad. To see what is right and not to do it, is want of courage." The address was received most enthusiastically.

MEETINGS AND CONVENTIONS

The following list gives the names of secretaries, dates of next or regular meetings, and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Demurrage Commissioner, 845 Old South Bldg., Boston, Mass. Annual convention, March 23, 1915, Jefferson Hotel, Richmond, Va.
- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Next meeting, April 15-16, San Francisco, Cal.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except June, July and August, 220 W. 57th St., New York.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Piedmont Hotel, Atlanta, Ga.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- NATIONAL RAILWAY APPLIANCE ASSOCIATION.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Next meeting, March 15, 1915, Chicago. Annual meeting, September 21-24, 1915, Salt Lake City, Utah.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.
- TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEWARK.—John J. Kautzmann, P. O. Box 238, Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, Newark.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.
- TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.
- WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF DECEMBER, 1914

Name of road.	Average mileage operated during period.	Operating revenues			Maintenance—		Operating expenses			Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) last year.	
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Trans- portation.	Miscel- laneous.					General.	Total.
Atchison, Topeka & Santa Fe.....	8,514	\$5,062,185	\$1,917,018	\$7,689,720	\$1,055,762	\$1,449,422	\$172,353	\$2,268,803	.....	\$152,088	\$5,112,257	\$342,231	\$2,233,538	\$108,982
Atlantic & St. Lawrence.....	167	156,286	21,967	200,823	13,847	33,421	4,094	70,419	.....	5,059	126,841	10,800	63,182	70,118
Atlantic City.....	170	54,710	61,659	126,520	27,444	12,266	1,400	80,958	.....	1,098	123,273	13,500	10,253	35,042
Baltimore & Ohio—System.....	4,516	5,042,893	1,077,683	6,470,752	587,101	1,117,388	136,851	2,782,102	43,599	165,572	4,852,504	268,216	1,552,229	205,889
Boston & Maine.....	2,301	2,043,777	1,202,920	3,588,975	438,256	556,947	32,047	1,696,891	13,594	121,523	2,861,259	199,292	528,425	109,154
Canadian Pacific Lines in Maine.....	233	100,015	27,845	135,860	26,025	16,639	5,299	72,195	.....	4,065	124,223	12,000	363	20,452
Carolina, Clinchfield & Ohio.....	248	144,877	12,539	161,314	14,295	23,331	5,690	35,944	.....	9,621	87,917	14,250	58,992	40,408
Central of New Jersey.....	18	9,795	396,067	2,179,214	1,039	85	1,645	85	.....	638	5,338	750	5,557	3,319
Central of New York.....	678	1,655,929	396,067	2,179,214	175,267	457,702	27,067	830,912	12,496	47,952	1,549,433	120,928	508,853	32,571
Central New England.....	304	243,411	38,036	296,724	27,956	35,941	1,182	114,442	.....	1,353	180,873	12,001	103,849	8,595
Central Vermont.....	411	207,881	61,285	259,963	25,963	51,544	8,358	151,248	2,294	9,000	248,408	15,760	27,762	40,776
Chicago & Eastern Illinois.....	1,282	907,126	231,028	1,229,861	152,874	238,440	23,353	488,099	7,672	38,086	947,650	30,400	251,733	137,174
Chicago & Erie.....	270	362,630	43,950	456,145	83,189	75,269	17,540	239,147	2,779	11,819	413,248	Cr. 5,650	48,547	108,248
Chicago, Burlington & Quincy.....	9,377	5,428,765	1,577,336	7,729,151	460,667	1,292,127	149,016	2,633,611	65,030	174,754	4,775,204	331,488	2,622,459	175,925
Chicago, Det. & Canada Gr. Trunk Jctn.	60	45,657	8,885	61,206	7,141	16,264	1,317	46,977	.....	1,778	73,476	2,870	15,145	22,373
Chicago, Indiana & Southern.....	359	296,199	24,891	322,267	72,888	117,517	11,182	132,742	1,362	10,325	346,015	16,372	30,395	69,927
Chicago, Indianapolis & Louisville.....	618	294,628	136,026	474,033	36,549	102,115	20,282	202,401	291	20,700	383,948	26,744	63,112	48,020
Chicago, Rock Island & Pacific.....	7,852	3,808,843	1,398,981	5,602,306	722,851	895,883	145,689	2,515,982	37,332	148,149	4,458,427	266,984	876,482	277,298
Colorado & Southern.....	1,092	525,716	100,995	679,504	46,566	125,784	10,572	217,341	2,253	21,042	423,559	35,600	220,341	234,886
Delaware, Lackawanna & Western.....	960	2,346,238	657,026	3,562,409	316,424	591,882	71,126	1,219,139	27,465	76,751	2,293,254	25,832	1,242,529	71,824
Denver & Rio Grande.....	2,569	1,235,321	292,928	1,631,485	103,982	316,694	36,352	517,315	19,653	50,895	1,044,891	85,500	500,978	31,075
Denver & Salt Lake.....	255	118,522	17,841	133,573	13,632	22,676	1,653	51,157	.....	4,973	94,077	6,000	43,496	54,780
Detroit & Mackinac.....	400	38,877	24,525	69,677	8,810	16,366	2,186	30,947	.....	2,807	61,116	5,615	2,946	2,080
Detroit & Toledo Shore Line.....	79	136,930	.....	136,930	1,535	1,222	1,222	37,991	.....	2,788	58,810	78,374	72,074	5,940
Detroit, Grand Haven & Milwaukee.....	191	139,089	45,249	210,684	25,050	33,407	5,953	105,857	842	5,204	176,313	3,360	30,921	7,746
Detroit, Toledo & Ironton.....	441	111,133	12,477	131,106	22,943	38,087	3,900	112,977	.....	5,855	183,762	6,000	58,656	12,182
Duluth & Iron Range.....	292	42,625	19,340	67,852	39,722	57,520	1,800	60,932	2,330	10,415	168,010	Cr. 2,244	97,914	50,446
Duluth, Missabe & Northern.....	369	27,355	26,166	58,252	11,918	98,423	1,878	63,382	1,654	24,282	143,286	9,647	152,933	38,483
Duluth, South Shore & Atlantic.....	628	114,322	67,926	199,540	29,050	34,869	9,165	89,545	3,544	9,027	175,201	23,370	23,370	5,743
Duluth, Winnipeg & Pacific.....	185	79,314	17,188	99,044	6,014	2,018	2,473	39,982	1,344	5,837	75,833	4,952	18,259	23,932
Erie.....	1,988	3,000,561	696,701	4,092,108	643,734	1,375,672	97,409	1,725,782	30,331	99,591	3,957,863	134,245	309,343	695,768
Florida East Coast.....	696	230,878	159,738	446,298	60,122	65,236	11,180	135,693	3,286	14,116	283,693	162,605	144,605	5,173
Fort Worth & Denver City.....	454	362,234	141,367	526,596	48,099	78,467	6,434	215,885	3,270	13,702	365,856	160,740	148,590	36,684
Galveston, Harrisburg & San Antonio.....	1,350	561,413	278,413	906,192	134,424	152,960	33,043	419,280	8,541	36,241	784,304	38,286	83,251	104,407
Grand Trunk Western.....	347	437,512	92,278	568,303	121,491	95,532	16,794	269,204	7,952	17,819	528,792	35,920	32,334	62,950
Great Northern.....	9,077	3,092,105	956,837	4,595,680	435,492	601,789	93,316	1,444,399	61,547	98,529	2,729,602	331,348	1,534,669	113,367
Gulf, Colorado & Santa Fe.....	1,937	1,347,297	257,004	1,670,619	190,913	236,360	26,391	546,011	.....	34,974	1,034,651	41,854	593,645	514,000
Houston, East & West Texas.....	191	68,311	24,006	97,526	17,779	16,927	1,856	46,926	.....	3,713	87,201	10,325	5,065	33,683
Houston & Texas Central.....	857	380,722	121,115	535,247	88,080	81,695	16,022	219,389	1,494	18,483	424,691	26,717	83,679	80,644
Lake Shore & Michigan Southern.....	1,852	2,490,136	1,036,767	4,046,920	309,378	726,811	70,187	1,511,295	45,199	209,495	2,872,366	232,400	941,883	1,035,301
Louisiana Western.....	208	126,982	61,627	200,119	17,001	26,719	7,135	60,685	2,790	6,113	120,417	15,928	63,771	29,644
Michigan Central.....	1,800	1,356,485	728,349	2,656,591	238,141	412,854	63,842	1,177,408	55,050	56,280	2,003,375	30,350	522,346	88,559
Minneapolis & St. Louis.....	1,646	666,608	157,552	822,771	77,748	107,287	16,321	356,095	86	20,671	578,207	39,496	255,068	48,093
Minneapolis, St. Paul & Sault Ste. Marie.....	4,127	1,416,491	437,650	2,234,432	121,072	328,984	46,378	763,429	13,674	51,875	1,815,289	708,143	59,999	68,337
Missouri, Kansas & Texas System.....	3,865	2,003,881	731,984	2,931,064	366,677	309,598	52,634	1,126,162	26,122	81,863	1,961,338	969,726	874,168	505,140
Missouri Pacific.....	3,920	1,684,998	371,249	2,242,726	300,244	437,038	52,468	1,025,031	5,609	53,461	1,873,850	98,590	268,698	197,208
Morgan's La. & Tex. R. R. & S. Co.....	1,122	712,589	104,624	878,750	60,197	102,446	37,876	332,432	2,449	28,395	563,795	30,347	284,455	13,934
Morgan's La. & Tex. R. R. & S. Co., Nashville, Chattanooga & St. Louis.....	405	328,368	99,851	464,963	49,003	63,718	11,613	165,130	2,402	11,929	303,690	161,273	139,272	53,677
Nashville, Chattanooga & St. Louis.....	1,230	560,235	210,900	844,405	103,013	168,444	46,828	376,121	8,578	29,940	732,924	111,481	84,130	121,775
Nevada Northern.....	165	60,359	5,061	68,497	14,962	13,459	4,407	21,936	47	3,594	54,404	3,651	10,441	64,261
New Orleans & North Eastern.....	204	215,166	47,951	290,006	26,080	52,711	9,873	101,408	5,996	11,307	207,375	15,090	67,541	4,980
New Orleans, Mobile & Chicago.....	403	111,295	24,836	143,988	29,341	13,112	3,540	52,115	Cr. 3	6,769	104,373	6,480	32,221	32,071
New York Central & Hudson River.....	3,699	5,003,266	2,482,255	8,897,565	1,003,202	1,766,887	150,873	3,425,036	178,379	342,048	6,766,425	433,408	1,696,874	18,419
New York, New Haven & Hartford.....	2,003	2,300,515	2,114,604	5,015,072	603,453	845,114	36,866	2,600,883	50,172	149,044	3,746,442	205,000	1,063,267	37,655
New York, Ontario & Western.....	568	493,989	81,181	673,101	72,174	146,645	8,306	306,305	.....	16,260	349,889	20,000	103,211	11,294
New York, Susquehanna & Western.....	140	206,143	41,285	276,521	21,350	3								

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF DECEMBER, 1914—CONTINUED

MONTH OF DECEMBER, 1914—CONTINUED

Average mileage operated during period.

Name of road.

Name of road.	Average mileage operated during period.	Operating revenues			Maintenance		Operating expenses			Net operating revenue (or deficit).	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) last year.
		Freight.	Passenger.	Total.	Way and structures.	Of equipment.	Traffic.	Trans- portation.	Miscel- laneous.				
Tennessee Central	294	\$72,817	\$30,800	\$103,617	\$25,375	\$16,601	\$5,410	\$47,042	\$9,501	\$4,480	\$5,007	
Terminal R. R. Ass'n of St. Louis	35	183	219,632	219,815	16,376	70,138	8,599	89,498	101,347	121,610	98,022	
Texas & New Orleans	469	193,724	391,224	584,948	59,701	70,138	8,599	172,785	121,610	26,997	17,925	
Texas & Pacific	1,887	1,133,616	391,224	1,524,840	157,337	285,547	37,305	706,396	17,451	71,925	34,992	
Toledo & Ohio Central	446	297,561	362,385	659,946	57,492	76,804	14,197	158,755	460,175	17,460	34,992	
Toledo, Peoria & Western	248	47,944	36,152	84,096	10,950	25,059	2,575	44,223	43,532	77,836	31,852	
Toledo, St. Louis & Western	451	294,559	24,905	319,464	34,462	37,258	16,973	17,855	2,635	26,498	17,027	
Trinity & Brazos Valley	315	71,055	13,889	84,944	14,242	12,312	2,498	31,368	6,913	17,864	3,465	
Union & Delaware	129	38,701	13,597	52,298	65,119	14,961	982	36,530	10,126	3,190	13,337	
Vicksburg, Shreveport & Pacific	171	36,249	110,358	146,607	18,571	26,849	3,862	45,147	14,979	3,300	19,060	
Washington & Southwestern	240	135,431	12,308	147,739	22,029	36,342	3,314	46,672	14,644	9,207	5,437	
Western Pacific	2,519	1,586,835	484,110	2,070,945	236,636	458,813	79,997	1,079,015	39,027	6,666	32,361	
Western Union	943	297,901	65,201	363,102	50,428	58,789	32,184	155,275	353,350	29,053	274,103	
Spokane, Portland & Seattle	556	210,681	104,356	315,037	41,318	36,434	6,703	88,677	60,635	26,949	33,637	
Atchison, Topeka & Santa Fe	8,514	34,038,876	11,990,589	46,029,465	7,258,595	8,548,100	998,135	13,778,288	154,055	53,400	100,512	
Atlantic & St. Lawrence	167	539,836	186,042	725,878	126,149	118,905	24,320	326,579	84,909	471,229	268,169	
Baltimore & Annapolis	170	410,785	956,165	1,366,950	244,375	137,861	15,773	671,310	4,500	29,023	20,522	
Baltimore & Ohio—System	4,516	35,694,359	7,933,646	43,628,005	4,860,833	8,765,541	959,408	18,174,917	76,702	4,730,023	188,900	
Canadian Pacific Lines in Maine	233	358,528	123,581	482,109	3,876,554	37,361,916	228,265	10,370,801	68,001	443,329	130,922	
Carolina, Clinchfield & Ohio	248	968,409	99,225	1,067,634	138,461	90,120	35,045	252,877	1,934,459	314,900	1,619,145	
Central New Jersey	18	55,132	9,663	64,795	97,756	139,034	39,804	213,426	78,602	70,993	704,570	
Central New England	678	10,855,766	3,315,238	14,171,004	1,313,342	2,598,423	182,725	5,069,663	1,969,652	1,969,011	17,311,632	
Central Vermont	411	1,338,999	494,534	1,833,533	1,374,253	216,729	6,656	655,768	63,296	17,220	46,059	
Chicago & Eastern Illinois	1,282	5,517,469	1,417,696	6,935,165	283,719	325,008	48,468	900,756	371,951	94,560	277,383	
Chicago & Erie	270	2,318,176	317,808	2,635,984	896,755	1,584,736	137,466	2,780,562	1,616,300	371,951	1,243,352	
Chicago, Burlington & Quincy	9,377	34,281,615	11,258,812	45,540,427	2,895,516	4,955,959	135,053	13,811,136	5,660,417	314,900	1,619,145	
Chicago, Det. & Canada Gr. Trunk Jctn.	60	326,473	97,441	423,914	5,100,982	8,060,426	823,630	15,090,511	2,110,911	784,605	1,326,306	
Chicago, Indianapolis & Southern	359	1,890,271	165,740	2,055,999	71,460	75,747	10,350	238,322	1,035,982	30,513,564	1,969,011	
Chicago, Rock Island & Pacific	618	2,216,485	903,394	3,119,879	317,998	571,364	47,733	728,592	847	424,727	63,296	
Chicago, Rock Island & Pacific	7,852	2,383,568	9,550,400	11,933,968	5,430,384	5,959,148	874,271	14,156,279	2,438,926	2,438,926	160,093	
Chicago, St. Louis & Northern Indiana	1,092	3,091,815	806,674	3,898,489	4,193,976	2,602,013	3,559,118	6,960,679	116,435	2,901,713	1,292,263	
Chicago, St. Louis & Northern Indiana	960	15,978,878	4,536,291	20,515,169	2,602,013	3,559,118	416,000	6,960,679	140,767	14,057,923	8,006,462	
Denver & Rio Grande	2,569	8,922,689	2,529,306	11,452,000	1,672,515	2,168,378	231,408	3,463,227	8,019,796	4,177,564	535,500	
Denver & Salt Lake	255	699,509	202,815	902,324	111,033	157,685	1,514	304,030	32,757	617,007	336,467	
Detroit & Mackinac	400	339,026	175,328	514,354	73,366	94,387	1,393	202,555	16,264	401,546	157,971	
Grand Haven & Milwaukee	79	735,591	737,350	1,472,941	80,989	60,791	10,310	203,332	371,923	365,427	36,200	
Grand Haven & Milwaukee	191	885,787	100,818	986,605	225,490	201,791	421,153	663,445	1,167,881	212,522	61,454	
Grand Haven & Milwaukee	441	885,787	100,818	986,605	225,490	201,791	421,153	663,445	1,167,881	212,522	61,454	
Grand Haven & Milwaukee	441	885,787	100,818	986,605	225,490	201,791	421,153	663,445	1,167,881	212,522	61,454	
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Grand Haven &													

Traffic News

A press despatch from Butte, Mont., reports cotton, by the trainload going through there on the way to the Pacific coast, bound for Russia.

The Canadian Pacific has notified the Canadian Railway Commission that the Canadian railroads are preparing to apply to the board for permission to make a general increase in freight rates east of Port Arthur. It is reported that the plan contemplates a general advance of 5 per cent. Canada is about to impose new taxes, war taxes, which, no doubt, will bear heavily on the railroads.

The Department of Agriculture on February 15 extended its quarantine regulations against foot-and-mouth disease to include all territory east of the Mississippi river and north of the state of Tennessee. Shipments from this territory to the south or west cannot be made except of animals to be killed within 48 hours. The state of Rhode Island has ordered the closing of all slaughter houses in the state for an indefinite period.

Mr. Ford, of the Cincinnati, New Orleans & Texas Pacific, has issued a second three-page circular telling agents and shippers of business opportunities in foreign countries as gleaned from the publications issued by the government. Mr. Ford's survey includes the whole world. Cast iron pipe, for water, is wanted in the Canary Islands; Zurich, Switzerland, wants from a million to five million oak railroad ties; Chile wants machinery for making wood pulp; and so on.

It is reported that a flood of petitions, both from individuals and from commercial organizations, urging increases in freight and passenger rates for the railroads, have been received by the Missouri legislature. On February 8, petitions of this kind were presented to the legislature by five state senators and 125 members of the house, and were referred to the committees on railroads. It is said that approximately 10,000 names were signed to the petitions and that about 5,000 letters were received by the legislators.

The Traffic Club of New York

At the regular monthly meeting of the Traffic Club of New York, to be held at the Hotel Astor, on Tuesday, February 23, W. S. Kies, manager of the foreign trade department of the National City Bank, will speak on "Our Expanding Foreign Trade."

Annual Dinner, Traffic Club of Pittsburgh

The Traffic Club of Pittsburgh has announced that its thirteenth annual dinner will be held in Memorial Hall, Pittsburgh, Pa., on the evening of Friday, March 5. George A. Blair, assistant freight traffic manager of the Chicago, Milwaukee & St. Paul, will act as toastmaster, and the speakers will be W. L. Clause, president of the Pittsburgh Plate Glass Company, who will speak on "The Federal Trade Commission," and Hon. John W. Weeks, senator from Massachusetts, who will speak on "The Relation of the Government to Business." President E. S. Lalk will preside.

Car Surpluses and Shortages

The American Railway Association's Committee on Relations Between Railroads, Arthur Hale, chairman, resuming the work discontinued last autumn, has issued statistical statement No. 1, giving a summary of freight car surpluses and shortages for February 1, 1915, compared with similar figures for November 1, 1914. The total surplus was, on February 1, 1915, 227,473; November 1, 1914, 172,325; February 1, 1914, 211,960. (The statement for November was given in the *Railway Age Gazette*, November 20, page 986.)

Reports as of February 1, 1915, have been received from 159 roads, operating 1,854,150 cars, while figures for November 1, 1914, were furnished by 192 roads operating 2,203,414 cars. It is therefore probable that had reports been received from the

same number of roads in February the surplus would have been increased by approximately 50,000 cars, or to a total of 277,000. The greater part of the surplus increase over the figures of November 1, 1914, is in Group 2 (Eastern) and consists chiefly of coal cars.

In the surplus grand total this increase is offset to some extent by a large reduction in box cars in Group 11 (Canada), due to the failure of two large roads in that section to report.

The total shortage was, on February 1, 1915, 832; November 1, 1914, 2,229; February 1, 1914, 2,282. The shortage is negligible.

The figures showing the surplus and shortage by classes of cars follow:

Classes.	Surplus.	Shortage.
Box	40,533	493
Flat	16,243	56
Coal and gondola.....	133,200	201
Other	37,497	82
Total	227,473	832

Two-Cent Fares in Missouri

The Missouri Public Service Commission reports to the legislature of that state that, according to returns sent in by nine principal railroads of the state, the receipts of those roads for passenger fares in 1914 amounted to \$992,946 less than in the year 1913. The falling off in passenger receipts on the Burlington road in Missouri was \$330,912, and on the St. Louis & San Francisco \$323,756.

Illinois and Iowa Campaigns for Higher Passenger Fares

The Illinois railroads are having published in newspapers throughout the state a reply to a statement made by Ralph D. Rosetiel of the United Commercial Travelers' Association, that 50,000 traveling men in Illinois spend \$25,000,000 a year in traveling expenses. The railroads' statement shows that the official report of the Illinois Railroad & Warehouse Commission for the fiscal year ending June 30, 1913, gives the total passenger traffic earnings on Illinois railroads as \$41,642,000; so that the assertion that more than 60 per cent of the railroad traveling in Illinois was done by commercial travelers, appears ridiculous on the face of it. It is also stated that the records of the mileage bureaus of the passenger associations of Illinois railroads show that only about 8 per cent of the passenger traffic comes from commercial travelers. Eight per cent of the total passenger earnings in Illinois in 1913 would be \$3,331,360. It is also shown by the railway mileage bureau records that over 90 per cent of the railway fares of commercial travelers are paid by their employers. The remainder is paid by commercial travelers who work on a commission basis and pay their own expenses. The statement also says that a majority of the members of the Travelers' Protective Association of Ohio have written to the secretary of the organization that they are in favor of increasing the passenger fare in Ohio to 2½ cents a mile. The Merchants' & Manufacturers' Association of Cincinnati, including large employers and traveling salesmen, has also unanimously adopted resolutions in favor of a 2½ cent a mile law in Ohio.

As a result of the first week's campaign of the passenger officers of the Illinois railroads for an increase in the state passenger fare from 2 cents to 2½ cents per mile, resolutions endorsing the petition of the railroads have been adopted by seven commercial organizations before which the railroad men presented their case. Other organizations have referred the matter to their boards of directors. The commercial clubs that endorsed the plan were those at Galena, DeKalb, Danville, Dixon, Peoria, LaSalle and Peru. The resolutions which the railroad men asked the clubs to adopt include a recommendation to the representatives and senators in the legislature that "upon proper showing by the railroads that such an increase is reasonable, that the law be so amended as to fix the maximum railroad rate for passengers traveling in Illinois at 2½ cents per mile instead of 2 cents per mile, thus restoring to the railroads one-half the reduction which was made in passenger fares when the present law was enacted." The speaking campaign will be continued this week at a large number of additional cities throughout the state.

A committee of presidents of railroads running through Iowa held a conference with Governor Clarke, at Des Moines, on Tuesday, to ask the support of the state officers in their proposed campaign for an increase in the passenger fare from 2 to 2½ cents a mile and a general revision of state freight rates.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

A hearing was held in Chicago on February 10, before an examiner for the commission, on complaint of shippers in the East Chicago and Indiana Harbor districts of Indiana, against a 5 per cent increase in freight rates to Illinois points. The points affected have been considered heretofore as a part of the Chicago switching district, and have had Chicago rates, but in connection with the general 5 per cent advance in interstate freight rates in Central Freight Association territory the rates were advanced in October, 1914. The industries affected are complaining because of the discrimination created, because the Illinois Public Utilities Commission suspended the 5 per cent advance as applied to intrastate business, which gives shippers in the Chicago district on the Illinois side of the state line an advantage over their competitors just across the line in Indiana. The railroads obtained an order from the Interstate Commerce Commission giving relief from the operation of the fourth section from the Calumet district, but on later complaints the commission ordered a new hearing. The railroad defense at the hearing was that the discrimination was created by the action of the Illinois commission in suspending the intrastate rates.

Kansas-California Flour Rates

Opinion by Commissioner Clements:

This proceeding is supplementary to *Kansas-California Flour Rates*, 29 I. C. C., 459, *Arizona Wheat Rates*, 29 I. C. C., 424, and *Arizona Corporation Commission v. Arizona & New Mexico*, 29 I. C. C., 424. Following the decision in those cases the carriers involved asked permission to increase the rates on wheat and flour in connection with the general readjustment of rates contemplated by them, pursuant to the Supreme Court's decision in the *Intermountain Rate cases*. Upon further hearing the commission finds that the defendant carriers have justified proposed increases in the rate on flour in carloads from 65 to 75 cents per 100 lb. from points in Kansas, Nebraska, and neighboring states to California terminals, and such a rate will be permitted to become effective, provided the difference between the rates on wheat and flour does not exceed 8 cents; and provided the rates on said commodities to the terminals are not exceeded at intermediate points. (32 I. C. C., 602.)

Rates to Columbia, S. C.

Columbia Chamber of Commerce v. Southern Railway et al. Opinion by Commissioner McChord:

In its original decision in this case the commission held that Columbia was discriminated against in favor of Augusta, Ga., in rates from eastern and western points of origin. It was held with respect to commodity rates from the east and to class and commodity rates from Cincinnati, Louisville and Knoxville, that the differences in the location of the two cities or their competitive relationship to the ports were not sufficient to justify the differences in rates in favor of Augusta, and it was ordered that in the future the rates from these points of origin to Columbia should not exceed the rates from the same points to Augusta. The commission also ordered that on specific commodities by rail or by water-and-rail from Baltimore, Md., to Columbia rates should not exceed those from the same points to Augusta. Rates on classes and on specific commodities from Cincinnati, Louisville and Knoxville were ordered not to exceed those from the same points to Augusta. This decision is now so amended that the conclusions with respect to commodity rates from points from which the rates are made with relation to the rates from Baltimore to Columbia and to Augusta, Ga., shall not cover points in New England. In view of the re-adjustment of rates in the southeast, now progressing, no order is made at this time with respect to class and commodity rates from Cincinnati, Louisville and Knoxville to Columbia and to Augusta. (32 I. C. C., 504.)

Reshipping Rates on Grain from Omaha

Opinion by the commission:

The commission finds that the carriers have not justified proposed increased joint reshipping rates on wheat, corn and articles taking the same rates in carloads from Omaha and South Omaha, Neb., and Council Bluffs, Ia., applicable via the Wabash to Mexico, Mo., to stations in Illinois on the line of the Chicago & Alton. It is found, however, that the carriers have justified such rates on these commodities in carloads, applicable via Mexico, to stations on the south branch of the Chicago & Alton, which extends from Mexico to the Missouri river. The carriers also proposed joint reshipping rates via Mexico to stations on the line of the Chicago & Alton from Mexico to Blue Springs, Mo. As these rates are lower than the combination or class rates now in effect, they also are found justified.

The fourth section application filed by the Wabash which asks authority to continue carload rates on wheat, corn and articles taking the same rates from Omaha, via Mexico, to points on the Chicago & Alton east of the Mississippi river lower than those contemporaneously in effect on like traffic to intermediate points is denied. (32 I. C. C., 590.)

Omaha Grain Exchange v. Chicago & Alton et al. Opinion by the commission:

The commission finds that the carriers should establish joint reshipping carload rates on wheat, corn and articles taking the same rates, from Omaha and South Omaha, Neb., and Council Bluffs, Ia., via the Wabash to Mexico, Mo., and the Chicago & Alton beyond to certain stations on the main line of the latter between Mexico and the Mississippi river. The complainants also requested similar rates to all south branch stations of the Chicago & Alton from Mexico to the Missouri river, which rates are covered in *Reshipping Rates on Grain from Omaha* abstracted above. Reparation is awarded, however, on certain shipments to south branch stations. (32 I. C. C., 597.)

Rate Suspensions

The commission has issued the following notice to the public:

While the law authorizes the commission to suspend proposed increased rates, fares or charges, it does not contemplate that such suspension will necessarily follow every request therefor, but does contemplate that the power will be exercised with judgment and due consideration for circumstances and conditions.

In the exercise of that power, the commission desires to act intelligently and to have opportunity to exercise a reasonable discretion in the matter before the increase in question becomes effective. It is therefore important and very desirable that such protests, if made, should be made at the earliest practicable moment, so that the members of the commission can be advised in the premises before determining what action they will favor. In instances it has been necessary to deny requests for suspension because they came so late that it was impossible to act upon them intelligently, and sometimes they are so late as to render affirmative action impossible even if it were desired to take it.

The commission wishes to exercise this power in every case where it ought to be exercised and to withhold exercise of it in every instance in which it ought to be withheld. It desires to act intelligently and to do substantial justice as nearly as that can be judged upon a partial showing, which is all that can be had pending full hearing.

To the end that this line of work may be conducted in an orderly and proper manner, the commission requests that when such protests are to be made they be made as far in advance of the effective date of the rate, fare or charge protested against as is possible, and calls attention to the fact that because of the short time afforded it may be necessary to deny suspension in instances in which the protest is not filed with the commission at least 10 days prior to such effective date.

Fourth Section Violations in Rates on Sugar

Opinion by the commission:

The carriers serving the territory affected by Fourth Section Order No. 4086, entered in *Sugar Rates from New Orleans and points taking the same rates to Ohio river crossings, Memphis, St. Louis and intermediate points*, 31 I. C. C., 495, find that re-adjustments of their sugar rates in accordance with the mileage scale prescribed will result in large reductions in revenues. Each

of them, therefore, has submitted a scale which it is desired to establish in lieu of the prescribed mileage scale. The rates proposed are designed to preserve the revenues on this traffic and to bring about a more uniform and logical adjustment of rates under the fourth section.

The commission finds that the suggested rates are in many ways better than the average mileage scale. It will allow the carriers to use their proposed scale with certain modifications.

The proposed rate to Montgomery for a distance of approximately 320 miles is 21½ cents, which will be observed as maximum at intermediate points on the direct line. The proposed rate to Birmingham is also 21½ cents for 355 miles, which also will be observed as maximum to intermediate points.

The proposed rate to Memphis via the Illinois Central is 13½ cents, and to intermediate points 25 cents. These two rates do not bear a reasonable relation. These carriers are, therefore, authorized to establish rates not exceeding 21½ cents to all points not more than 360 miles from New Orleans on routes from that point to the Ohio and Mississippi river crossings.

The proposed rates to points north of Memphis and Birmingham in Mississippi, Alabama, Tennessee and Kentucky vary from 25 to 28 cents per 100 lb. These points are from 360 to 800 miles from New Orleans, and the proposed rate of 28 cents to the more northerly of these points is not unreasonable. The carriers are authorized to establish rates to points more than 360 miles from New Orleans and south of the southern boundary of Tennessee, which do not exceed 25 cents, and rates to points on these lines north of said boundary line not in excess of 28 cents, provided the rates which have been proposed by the carriers are not exceeded.

The carriers proposed also to cancel l. c. l. rates from New Orleans to certain points in the southeast. There being no real necessity for such rates, the commission will allow the discontinuance to go into effect.

In accordance with the wishes of the carriers, reference to the rates to points intermediate to St. Louis and north of the Ohio is left for consideration with the rates to points in Illinois and points in central freight association territory. (32 I. C. C., 606.)

Southern Pacific Retains Control of Pacific Mail

In this case, the first decided under the Panama Canal Act, the commission finds that it is in the public interest for the Southern Pacific to retain its controlling interest in the Pacific Mail Steamship Company, but that it would be unlawful for the latter as long as it is controlled by the railway to run its boats through the Panama Canal to Colon, even as an extension of the present service, from San Francisco to Balboa, at the Pacific end of the canal. The Southern Pacific is therefore authorized to continue its control of the steamship company, but within 60 days it must amend its petition so as to eliminate the proposed service beyond Balboa.

The Southern Pacific owns 110,800 of a total of 200,000 shares of stock in the Pacific Mail Company. That company owns two large fleets. One operates between San Francisco and Honolulu and ports in Japan and China. The other operates between San Francisco and Balboa, stopping at various points on the southwestern coast of Mexico and Central America. The steamships on this line make regular trips, stopping at Mazatlan, San Blas, Manzanillo, Acapulco and Salina Cruz, on the coast of Mexico, ports that are near to, and some of them directly served by, the Southern Pacific Railroad of Mexico. The traffic carried between San Francisco and Balboa has principally been transported over the Panama Railroad to or from Colon and via steamships bound for or from Atlantic coast points, Europe, and other foreign countries. It had been proposed, also, to operate the boats from San Francisco and the Mexican and Central American ports through the canal to Colon because the Panama Railroad had withdrawn from the through billing arrangements across the isthmus; but, as noted, the commission finds that such would be contrary to the act.

Section 5 of the act to regulate commerce, as amended by the so-called Panama Canal Act, provides among other things, that:

From and after the 1st day of July, 1914, it shall be unlawful for any railroad company or other common carrier subject to the act to regulate commerce to own, lease, operate, control, or have any interest whatsoever (by stock ownership or otherwise, either directly, indirectly, through any holding company, or by stockholders or directors in common, or in any other manner) in any common carrier by water operated through the Panama canal or elsewhere with which said railroad or other carrier afore-

said does or may compete for traffic or any vessel carrying freight or passengers upon said water route or elsewhere with which said railroad or other carrier aforesaid does or may compete for traffic; and in case of the violation of this provision each day in which such violation continues shall be deemed a separate offense.

Jurisdiction is hereby conferred on the Interstate Commerce Commission to determine questions of fact as to the competition or possibility of competition, after full hearing, on the application of any railroad company or other carrier.

It is, however, also provided that there need be no discontinuance of railroad ownership and control of water lines, if after investigation—

the commission is of the opinion that such existing specified service by water, other than through the Panama canal, is being operated in the interests of the public, and is of advantage to the convenience and commerce of the people, and that such extension will neither exclude, prevent nor reduce competition on the route by water under consideration.

There is indicated a clear, unmistakable policy on the part of Congress, to separate from railroad ownership, control, or influence such common carrier water lines, as may, when thus separated, compete with the present owning or controlling companies, except where, upon investigation, it is found by the commission that the existing service by water, other than through the Panama Canal, is being operated in the interest of the public, is of advantage to the convenience and commerce of the people, and that its continuance will neither exclude, prevent, nor reduce competition on the route by water. This being so, a construction of the act must be adopted which will properly and effectively carry out the purpose of Congress. The commission may not nullify or weaken the force of the plain intendment of the act for any reasons, however plausible they may appear to be. The words "may compete for traffic" do not mean a vague, possible though improbable competition, but mean a probable, potential competition, as when the water line is entirely divorced from the railroad. It must, therefore, look at the conditions as they will exist if this divorce is effected. From a practical view the question is, Will the steamship company, when free to consult only its own interests, compete for traffic with the railroad line? In the light of experience this will not be a difficult question to determine in most cases. Self-interest will surely develop an effort to secure desirable traffic—traffic that will produce revenue for the carrier.

It must also be observed that the competition is "for traffic." There are no words of limitation in this clause; it covers all interstate coastwise or foreign traffic.

It is the opinion of the commission that the railway and the steamship company compete for coastwise traffic between points in the United States; traffic between San Francisco and ports on the coast of Mexico and Central America; and for European and other foreign commerce.

But, on the other hand:

There are several boat lines of American and foreign ownership plying between San Francisco and these Mexican and Central American ports and Balboa in direct competition with the Pacific Mail Steamship Company. The uncontradicted testimony of witnesses for petitioner and of shippers is that the service of the Pacific Mail is the most dependable, and that it is operated in the interests of the public, and is of advantage to the convenience and commerce of the people. It appears that the service proposed, other than through the Panama Canal, would be in the interests of the public and of advantage to the convenience and commerce of the people, and that its continuance would neither exclude, prevent, nor reduce competition on the route by water under consideration. (32 I. C. C., 689.)

STATE COMMISSIONS

The Railroad Commission of Louisiana has suspended, until after a hearing, at some date yet to be fixed, its order of January 27, requiring the railroads of the state to cease charging car-rental in addition to the ordinary demurrage charges.

The Railroad Commission of California has made permanent the order issued by it about a year ago making radical reductions in the rates for the transportation of merchandise by express. It is said that the Wells-Fargo Company has its income reduced by this order to the amount of about \$750,000 a year.

The Missouri Public Service Commission has announced that at St. Louis on February 23, it will resume its hearings on the applications of the railroads for general advances in freight and

passenger rates throughout the state. Another hearing will be held beginning on March 8, at St. Joseph, and another at Kansas City, on March 10.

The Colorado Public Utilities Commission began a hearing at Denver on February 8, under its order to the Denver & Rio Grande, Colorado & Southern, Atchison, Topeka & Santa Fe and Midland Terminal railways, to show cause why the passenger fares between Cripple Creek and Divide and between Pueblo and Trinidad should not be reduced.

The Pennsylvania Public Service Commission has ordered that the fare, on the Delaware, Lackawanna & Western, from Taylor to Scranton, about $2\frac{1}{2}$ miles, which was increased from five cents to ten cents, shall be put back to the lower figure. The report of the case indicates that the railroad company advanced the rate because it desired to reduce the travel from Taylor to Scranton on a certain train, in the morning, so as to enable it to run that train with one day coach instead of two. The company frankly stated that it had sought to make the rate high enough to divert to other carriers most of the passengers for that short distance.

COURT NEWS

Misleading Passenger—Nominal Damages

Action was brought by a female passenger against a railroad company for damages for having been negligently misled by the company's employees in charge of the train and caused to leave it at a time when it stopped on a side track some 600 yards before it reached her destination. The jury awarded the plaintiff \$1 damages, and she appealed. On appeal it was held that as the plaintiff did not appear to have sustained any damages of a character susceptible of a pecuniary measurement in any wise exact, other than the value of the ride, which she lost, from the siding to her destination, the verdict could not be disturbed as contrary to the evidence. Although the jury found that the plaintiff suffered injuries, they were justified in believing that they were so slight that nominal damages would be adequate compensation. *Hilley v. Central of Georgia*, Alabama Court of Appeals, 66 So. 883.

Federal Employers' Liability Act—Interstate Commerce

In an action in the federal courts for personal injuries the plaintiff's declaration alleged that he was engaged in tearing down a roundhouse which had been rendered useless by a fire, and was injured by a falling timber. The active function of the roundhouse had ceased to exist, and the employment, therefore, was in connection with the removal of a useless structure, to the end that a new one might be built for railroad purposes, and very likely for uses in connection with interstate commerce. The court decided against the employee, sustaining a demurrer to the declaration; saying that there must be a line somewhere. If this case were within the line, it might as well be said that all employees on railroads, engaged both in interstate and intrastate commerce, might have the benefit of the federal Employer's Liability Act, with the result that, with few exceptions, all personal injury litigation would be in the federal courts. *Thomas v. Boston & Maine*, 218 Fed., 143.

Obstruction of Road Crossing—Willful Injury—Punitive Damages

A traveler on a highway sought to recover punitive damages for the alleged willful obstruction of a road crossing by a railroad company for an unreasonable time. The court held that the burden was on the plaintiff to establish a willful or intentional injury before he could recover punitive damages. The complaint alleged that the crossing was obstructed while the train men had gone with the engine to a nearby mine, but it did not allege that they knew the conditions so as to show a consciousness on their part that their conduct would probably result in injury. Nor was it alleged that the highway was one that was much or little used, or that the blocking occurred at a time when persons would likely be traveling on the highway, or what, if any, knowledge the defendant's employees had concerning such matters. It was held that the complaint was insufficient to charge a willful injury, and judgment for the plaintiff was reversed. *Southern Ry. Co. v. Jarvis*, Alabama Court of Appeals, 66 So. 936.

Railway Officers

Executive, Financial, Legal and Accounting

Charles W. Hotchkiss has been elected chairman of the board and of the executive committee of the Virginian Railway, with headquarters at New York. Mr. Hotchkiss was born on June



C. W. Hotchkiss

19, 1863, at Unadilla Forks, N. Y., and was educated at West Winfield Academy. He began railway work in August, 1886, as a rodman, and was engaged in construction work first on the New York, West Shore & Buffalo, now the West Shore, and then on the South Pennsylvania Railroad. He was then consecutively assistant engineer of the Michigan Central, chief engineer and general manager of the Chicago, Indiana & Southern and the Indiana Harbor Belt, the New York Central's industrial terminals and coal road in the vicinity of Chicago. In 1912 he was elected president of the Chicago Utilities Company and of the Chicago Tunnel Company, and is president also of the Richmond Light & Railroad Company, New York, and chairman of the board of the Atlantic Coast Electric Railway Company, Asbury Park, N. J. Mr. Hotchkiss is a member of the American Society of Civil Engineers, the Western Society of Engineers, the American Railway Engineering Association, the Chicago Club and the Mid-Day Club, Chicago, Engineers' Club, Lawyers' Club, and Richmond County Country Club, New York.

Raymond Du Puy, vice-president and general manager of the Virginian Railway, with office at Norfolk, Va., has been elected president with headquarters at Norfolk. Mr. Du Puy was born



Raymond Du Puy

on January 4, 1860, at Pittsburgh, Pa., and was educated at Georgetown University. He began railway work in 1877, as water boy on the Missouri, Kansas & Texas, and from 1878 to 1881 was assistant engineer on the same road and the Missouri Pacific. He was then to 1885, chief engineer and superintendent of the Tioga Railway, now a part of the Erie, and later for two years was general superintendent of the Minnesota & North Western. From 1887 to February, 1888, he was general manager of the Chicago, St. Paul & Kansas City, now a part of the Chicago Great Western. In 1891 he was elected president of the Leavenworth & St. Joseph, and from 1895 to 1896 was president of the DeKalb & Great Western; both these roads are now a part of the Chicago Great Western. On April 15, 1898, he was appointed general superintendent of the Chicago Great Western, remaining in that position until July, 1899, when he was appointed superin-

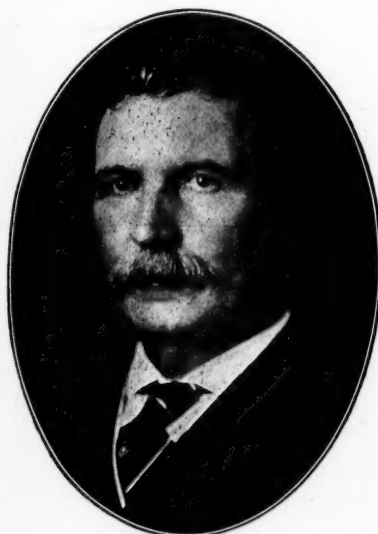
tendent of the Morris & Essex division of the Delaware, Lackawanna & Western. He left the latter company in May, 1900, and then served for five years as general manager of the St. Joseph & Grand Island, at St. Joseph, Mo. In April, 1905, he was appointed general manager of the Tidewater and the Deep-water Railways at Norfolk, Va., which were later consolidated to form the Virginian Railway, and in April, 1907, Mr. Du Puy was elected vice-president and general manager of the Virginian Railway, which position he held at the time of his recent election as president of the same road as above noted.

Edwin W. Winter has resigned as one of the receivers of the Chicago & Eastern Illinois.

Ralph M. Shaw has been appointed assistant general counsel of the Chicago Great Western, with office in the First National Bank building, Chicago.

Edward F. Kearney, first vice-president of the Texas & Pacific, with headquarters at New Orleans, La., has been appointed a receiver of the Wabash.

D. D. Curran, who has been elected chairman of the board of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, with headquarters at



D. D. Curran

New Orleans, La., as has already been announced in these columns, was born in Ireland, and began railway work in 1873, as a brakeman on the Pennsylvania Railroad, which position he held for five years. He was then successively freight conductor on the Mobile & Montgomery, then passenger conductor on the same road, and later yardmaster of its successor, the Louisville & Nashville at Montgomery, Ala. He was then appointed trainmaster on the same road at Birmingham, remaining in that position until 1887, when he entered the service of the Central of Georgia, and until

February, 1893, served as superintendent successively on the South Carolina division, the Southwestern division, the Columbus & Western division and the Savannah & Western division, having been appointed to the last named position in 1892. In February of the following year he became superintendent of the New Orleans & Northeastern, and in August, 1907, was elected president, later becoming also general manager of the same road and president and general manager of the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, and now becomes chairman of the board of the same roads as above noted.

Operating

A. A. Woods, resident engineer of the New Orleans & Northeastern, at New Orleans, La., has been appointed superintendent, vice S. E. Flanagan, deceased.

Charles Hicks has been appointed general manager of the Tennessee, Alabama & Georgia, with office at Chattanooga, Tenn., vice E. F. Blomeyer, resigned.

A. N. Umshler has been appointed trainmaster of the Illinois Central at Centralia, Ill., and F. E. Hatch has been appointed trainmaster at Carbondale, Ill.

R. W. Stevens, superintendent of the Chicago & Western Indiana at Chicago, has been appointed general superintendent, succeeding J. M. Warner, whose title was general manager.

H. Eicke, local freight agent of the Wabash, at Chicago, has been appointed superintendent of transportation, with headquarters at St. Louis, Mo., succeeding F. E. Bolte, resigned to accept service elsewhere.

James D. Welsh, general superintendent of the Colorado & Southern at Denver, Colo., has resigned, and E. S. Koller, as-

sistant general manager of the Chicago, Burlington & Quincy lines west of the Missouri river, at Omaha, Neb., succeeds Mr. Welsh, with headquarters at Denver, with the title of general manager.

J. W. Knapp, superintendent of terminals of the Chesapeake & Ohio at Newport News, Va., has been appointed superintendent of the Richmond division, vice E. I. Ford, who has been appointed superintendent of the Newport News and Norfolk terminals in place of Mr. Knapp, and J. F. Briant, assistant superintendent at Clifton Forge, Va., has been appointed assistant superintendent of the Richmond division, with headquarters at Richmond, and the office of assistant superintendent of the Clifton Forge division has been abolished.

O. K. Cameron, trainmaster of the Southern Railway at Birmingham, Ala., has been promoted to superintendent of the Mobile division, with headquarters at Selma, Ala., vice F. S. Collins, transferred. J. M. Hudspeth, superintendent of the Richmond division at Richmond, Va., has been appointed superintendent of the Richmond terminals, with headquarters at Richmond. C. G. Arthur, superintendent of the Charleston division at Charleston, S. C., succeeds Mr. Hudspeth. C. P. King, trainmaster at Columbia, S. C., succeeds Mr. Arthur. C. C. Hodges, superintendent of the Asheville division at Asheville, N. C., has been appointed superintendent of the Transylvania division, with headquarters at Brevard, N. C., and F. S. Collins, superintendent of the Mobile division at Selma, Ala., succeeds Mr. Hodges.

W. E. Williams, whose appointment as general manager of the Missouri, Kansas & Texas, with headquarters at Parsons, Kan., has already been announced in these columns,

was born May 29, 1864, at Houston, Tex. He began railway work in 1881 with the International & Great Northern as clerk to the roadmaster, and was subsequently in the bridge department, clerk in the superintendent's office, time-keeper, transportation clerk, chief clerk to the superintendent of transportation, to the general superintendent and to the general manager, and secretary to the receivers, until June, 1895. He was then purchasing agent and general storekeeper for two years. Mr. Williams became connected with the Mis-



W. E. Williams

souri, Kansas & Texas in September, 1897, as chief clerk to the general superintendent, and was consecutively car accountant and trainmaster until November, 1902. On the latter date he was advanced to superintendent at Greenville, Tex., and from December, 1905, to October, 1911, was successively superintendent at Denison, Tex., McAlester, Okla., and Sedalia, Mo. He was then appointed general superintendent, which position he held until his promotion to general manager on February 1, as above noted.

J. L. McLendon, assistant superintendent of the Southern Railway at Macon, Ga., has been appointed terminal trainmaster, with headquarters at Macon, Ga.; A. P. Johnson, trainmaster at Atlanta, Ga., has been appointed trainmaster of the South end of the Atlanta division, with office at Macon, with jurisdiction over lines south of Roseland, with the exception of Macon terminals. B. F. Langford has been appointed trainmaster of the North end of the Atlanta division, with jurisdiction over lines north of North Inman, with office at Atlanta; G. W. Adams has been appointed chief dispatcher, with office at Atlanta; W. T. Sutphen has been appointed trainmaster of the Richmond division, with office at Richmond, Va., vice W. C. Herbert; B. Haggard, trainmaster of the Northern Ala-

bama Railway at Sheffield, Ala., has been appointed trainmaster of the east end of the Birmingham division of the Southern Railway, with office at Birmingham, Ala., vice O. K. Cameron, and T. O. Crane has been appointed trainmaster of the Northern Alabama, with office at Sheffield, Ala., vice Mr. Haggard.

Engineering and Rolling Stock

W. McC. Bond has been appointed supervisor on Sub-Division No. 1 of the Baltimore & Ohio, Cleveland division, with headquarters at Akron, Ohio, vice T. Delaney, retired.

A. Young, roundhouse foreman of the Chicago, Milwaukee & St. Paul, at Chicago, has been appointed district master mechanic at Milwaukee, Wis. C. Lundburg succeeds Mr. Young.

William C. Armstrong, engineer of bridges of the Chicago & North Western at Chicago, has been appointed chief engineer of the St. Paul Union Depot Company, St. Paul, Minn., and will assume charge of the construction of the new union station. Mr. Armstrong was born in Marshall County, Iowa, June 21, 1859, and was graduated from the Iowa State College, Ames, Iowa, in 1881. He began railway work the following year as transitman and draftsman for the Wisconsin, Iowa & Nebraska (now a part of the Chicago Great Western), and the succeeding year was chief draftsman for that road. From 1884 to 1886 he was resident engineer of the Burlington, Cedar Rapids & Northern; during 1886 he was resident engineer of the Chicago, Milwaukee & St. Paul, in charge of construction in South Dakota, and also was engaged on location survey in South Dakota and Wyoming; and in 1887 was resident engineer on the St. Paul, Minneapolis & Sault Ste. Marie. The next two years he was resident engineer on the Eastern Minnesota (now a part of the Great Northern); and from 1890 to 1893, was engineer of track and bridges on the Pacific extension of the Great Northern, and in 1894 was bridge agent at Spokane, Wash. Mr. Armstrong went to the Toledo Bridge Company for four years as designer, returning to railway work in 1899 as resident engineer of the Chicago & North Western. From 1902 to 1905 he was bridge engineer of that road; during 1905 he was superintendent of construction for the Missouri Pacific at Sedalia, Mo.; in 1906 he was with the Chicago, Rock Island & Pacific as bridge engineer at Chicago, and the following year he returned to the North Western as terminal engineer at Chicago. In 1912 he was made engineer of bridges, which position he now resigns to become chief engineer of the St. Paul Union Depot Company, as above noted.

A. Berg has been appointed general foreman car department of the New York Central at Wesleyville, Pa., in place of O. Blodd, who has been transferred to Sandusky, Ohio, as general foreman, succeeding R. A. Fitz, transferred to Nottingham, Ohio.

Joseph Chidley, assistant superintendent of motive power and rolling stock of the New York Central Railroad, with office at Cleveland, Ohio, now has jurisdiction over the Illinois division. J. T. Flavin has been appointed master mechanic of the Illinois division, with office at Gibson, Ind., and the jurisdiction of George Thompson, district master car builder, with office at Englewood, Ill., has been extended over the Illinois division.

R. B. Kendig, chief mechanical engineer, of the New York Central Railroad, at New York, announces that the following appointments have been made in the mechanical department of that road: A. R. Ayers, who was general mechanical engineer of the Lake Shore & Michigan Southern and other New York Central

lines west of Buffalo, with office at Chicago, has been appointed principal assistant engineer, general duties car design and construction, with headquarters at New York. R. M. Brown has been appointed assistant engineer, in charge of engineering and drafting at locomotive and car shops, with headquarters at Cleveland, Ohio; P. P. Mirtz, who was mechanical engineer of the Lake Shore & Michigan Southern at Cleveland, Ohio, has been appointed assistant engineer, in charge of locomotive design and specifications, with headquarters at New York; F. S. Gallagher has been appointed assistant engineer, in charge of car design and specifications, with headquarters at New York; H. E. Smith, who was chemist and engineer of tests of the Lake Shore & Michigan Southern at Collinwood, Ohio, has been appointed chemist and engineer of tests, with supervision of laboratories and material inspection, with headquarters at Collinwood, and W. B. Geiser, who was acting chemist and engineer of tests of the New York Central & Hudson River at West Albany, N. Y., has been appointed assistant chemist and engineer of tests, with headquarters at West Albany.

OBITUARY

Richard Morgan, general manager of the Savannah & Northwestern, with office at Savannah, Ga., died in that city on February 8.

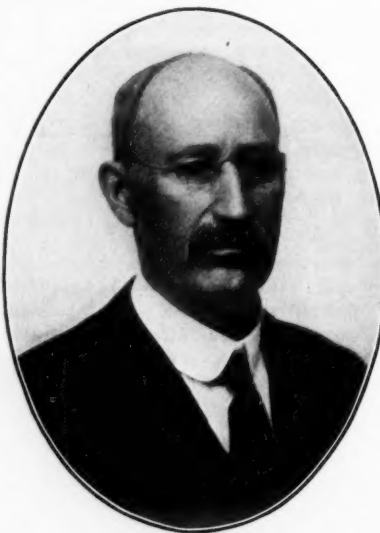
N. C. Collier, who was for many years a director of the Nashville, Chattanooga & St. Louis, died on February 6, at Murfreesboro, Tenn., at the age of 82.

James M. Warner, general manager of the Chicago & Western Indiana, who died in Chicago on February 8, was born on a farm near Syracuse, N. Y. He received a common school education and commenced railway work with the Erie as an office boy, with which road he remained for several years, filling consecutively the positions of telegraph operator, despatcher, chief despatcher and trainmaster of the Delaware division. He was then trainmaster for the Terre Haute & Peoria (now a part of the Vandalia), at Decatur, Ill., and in 1888 he became master of transportation of the Belt Railway of Chicago. Subsequently he was appointed trainmaster of that road and the Chicago & Western Indiana until 1892, when he was made superintendent of those roads. In 1905 Mr. Warner was appointed general superintendent, and in 1908 he was promoted to general manager. Mr. Warner for many years was a member of the Committee on Relations between Railroads of the American Railway Association, and for several years also was chairman of the General Superintendents' Association of Chicago.

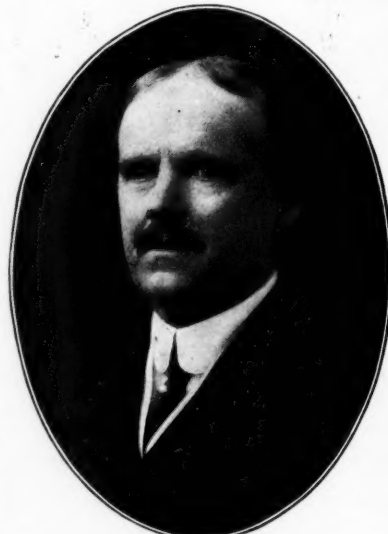
L. C. Hill, horticultural agent of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex., died at Rogers, Ark., on February 2, aged 58 years.

George T. Williams, formerly until 1892, superintendent of telegraph of the New York, Chicago & St. Louis, died on February 10, at his home in East Cleveland, Ohio, at the age of 82.

W. I. Trench, division engineer maintenance of way of the Baltimore & Ohio at Baltimore, Md., died in that city on February 7, aged 36 years. Mr. Trench was graduated from the Sheffield Scientific School in 1902, and immediately began railway work on the engineering corps of the Baltimore & Ohio Southwestern. He was advanced to assistant division engineer in April, 1906; was promoted to division engineer of the Ohio division in 1908, and had been division engineer of the Baltimore & Ohio at Baltimore for the past three years.



W. C. Armstrong



J. M. Warner

Equipment and Supplies

LOCOMOTIVE BUILDING

THE CHESAPEAKE & OHIO is in the market for 20 Mallet type locomotives.

THE SOUTH DAKOTA CENTRAL is in the market for one ten-wheel locomotive.

THE MISSOURI, KANSAS & TEXAS is in the market for 10 Pacific type locomotives, with 25 by 28 in. cylinders, and 20 Mikado type locomotives, with 28 by 30 in. cylinders.

CAR BUILDING

THE UNION PACIFIC has ordered 750 stock cars from the Haskell & Barker Car Company.

THE ATCHISON, TOPEKA & SANTA FE has ordered 700 box cars from the Haskell & Barker Car Company.

THE CHICAGO & NORTH WESTERN is considering the purchase of some passenger cars, but as yet the number and type have not been decided on.

THE PHILADELPHIA & READING has divided an order for 20 coaches and 5 combination cars between the Harlan & Hollingsworth Company and the Pullman Company.

THE ILLINOIS CENTRAL is now asking prices on 100 gondola cars. This inquiry supersedes the inquiry for five gondolas, as previously reported. In addition to the 900 refrigerator cars recently ordered from the American Car & Foundry Company, this company also ordered 100 refrigerator cars with passenger trucks.

IRON AND STEEL

THE GREAT NORTHERN is in the market for about 10,000 tons of steel rails.

THE DENVER & RIO GRANDE has ordered 10,000 tons of 90-lb. rails from the Colorado Fuel & Iron Company, Denver, Colo.

THE VICKSBURG, SHREVEPORT & PACIFIC has ordered 1,502 tons of steel for a bridge over the Red River in Louisiana, from the Modern Steel Structural Company.

THE CHICAGO & NORTH WESTERN, as reported in the *Railway Age Gazette* last week, has placed orders for rails. The exact figures are 20,000 tons of 100-lb. section for the Chicago & North Western proper, which is distributed between the Illinois, the Cambria and the Lackawanna steel companies, and 6,000 tons of 90-lb. section for the Chicago, St. Paul, Minneapolis & Omaha, which was awarded to the Lackawanna Steel Company.

SIGNALING

A contract has been taken by the Federal Signal Company for the installation of a mechanical interlocking plant at Beacon, N. Y., on the Hudson division of the New York Central. This consists of a 72 lever style "A" machine having 57 working and 15 spare levers, operating a standard four-track interlocking layout.

THE LONDON BAKERLOO TUBE EXTENSION.—The London Bakerloo Tube, which has recently been extended beyond Paddington to Queen's Park, four stations beyond, was on January 31 opened for service to Kilburn Park—or Cambridge avenue station—the third station beyond Paddington. Of the two intervening stations, Warwick avenue and Maida Vale—or Elgin avenue—the latter is not quite completed, so trains omit the stop at that point. This extension is intended eventually to connect with the London & North Western at Queen's Park. The rails to the latter point are laid and it is expected that the station will be ready for service some time in March.

Supply Trade News

The Chicago Bridge & Iron Works opened on February 15, a city sales office in the McCormick building, Chicago, Ill.

The New York office of the General Railway Signal Company will be situated at room 1041, 30 Church street, beginning Tuesday, February 23.

The Fairmont Machine Company, Fairmont, Minn., has changed its name to the Fairmont Gas Engine & Railway Motor Car Company, and has increased its authorized capital stock to \$1,000,000.

Blaine S. Smith has been appointed general sales manager, effective February 3, of the Universal Portland Cement Company, Chicago, Ill., succeeding B. F. Affleck, who has been elected president, as noted in the *Railway Age Gazette* of last week.

C. H. Rhoads, who has been connected with the St. Louis Surfacers & Paint Company, St. Louis, Mo., for four years, and with the Valentine Varnish Company for two years, was recently appointed western railway representative of the Kay & Ess Company, Dayton, Ohio.

The East Broad Top Railroad & Coal Company contemplates the remodeling or reconstruction of its facilities at Mt. Union, Pa., for transferring coal from narrow gage to standard gage cars after screening, and will consider plans and prices from engineering or contracting firms.

C. F. Quincy, president of the Q. & C. Company, New York, has acquired the entire capital stock of the Railway Appliances Company, Chicago, formerly owned by Percival Manchester. The business of the Railway Appliances Company will hereafter be operated by, and in the name of the Q. & C. Company.

After a thorough test for over 15 months, the United States government has just adopted the new style planfile, manufactured by the Art Metal Construction Company of Jamestown, N. Y., for use in the Interstate Commission for filing its various plans, drawings, etc. In this planfile drawings of all sizes are filed vertically, and in the same file. This arrangement affords a great saving in space as compared with the old style method.

TRADE PUBLICATIONS

NUT AND BOLT FASTENERS.—The Bartley Automatic Nut & Bolt Fastener Company, Pittsburgh, Pa., recently issued catalog No. 1, a 30-page booklet which describes and illustrates the Bartley automatic fasteners for nuts and bolts for use on rails, frogs and crossings, and on cars and locomotives. It also gives price lists for the various kinds of fasteners.

CULVERTS.—The United States Cast Iron Pipe & Foundry Company, Burlington, N. J., recently issued a 16-page pamphlet devoted to comments on the requirements for a good culvert, characteristics of the various types, the length, thickness and special shapes of culverts, etc. It also contains a table of standard thickness and weight of cast iron culvert pipe.

ELECTRIC METERS.—The Sangamo Electric Company, Springfield, Ill., has issued bulletin No. 40, dealing with the company's single-phase and polyphase alternating current watt-hour meters. The bulletin describes the type H Watthour Meter in detail and treats of it under such heads as, Importance of Sustained Meter Accuracy, Superior Features, Construction, Adjustment, Performance Characteristics and Capacities. A few pages are also devoted to the Sangamo Current and Potential Transformers.

CENTRIFUGAL PUMPS.—This is the title of a 64-page bulletin, No. 19, just issued by the Terry Steam Turbine Company, Hartford, Conn., giving details and data on various turbo-pump applications. Principles of operation and construction of the centrifugal pump are explained, as are details of the steam turbine. Because of the wide latitude of speed possible with the turbine, the unit occupies a much smaller space than would be required for a pump performing the same duty but driven by a reciprocating engine.

Railway Construction

BOSTON SUBWAYS.—Bids are wanted until February 25, by B. Leighton Beal, secretary of the Boston Transit Commission, for building section H of the Dorchester tunnel. This section is located in Dorchester avenue between Old Colony avenue and Woodward street in the city of Boston, and is about 2,200 ft. long. It is to be a single span, double track tunnel mainly of reinforced concrete construction, and is to be built by the cut and cover method.

CANADIAN NORTHERN PACIFIC.—The grading on the new line west of Victoria, Vancouver, towards Alberni, for a distance of 140 miles, and on the Patricia Bay branch, from Victoria to the ferry terminal on Patricia Bay is practically completed. No steel has been laid over these portions of the line.

CAROLINA, GREENEVILLE & NORTHERN (Electric).—This company expects to let contracts on May 1, to build an electric line from Kingsport, Tenn., southwest to Newport, about 75 miles. There will be five steel bridges on the line. The company expects to develop a traffic in agricultural products, minerals, timber, coal and passengers. H. S. Reed, president, 205 Grant building, Los Angeles, Cal., and F. A. H. Kelly, chief engineer, Greeneville, Tenn. (January 15, p. 115.)

MASCOT & WESTERN.—As reported in the *Railway Age Gazette* of last week, the company is building a line between Wilcox, Ariz., and the Mascot mines, a distance of 14 miles. The contract for grading, which will be light, has been awarded to J. A. Vaness, Seattle, Wash. The maximum curvature on the line will be 3 deg., and the maximum grade $3\frac{1}{2}$ per cent. Contracts for track laying and for bridges, which will be only minor structures, will be let about May 1, at which time the company also expects to buy some rolling stock. The work on this line is about 10 per cent completed. Preliminary surveys have also been made from the Mascot mines to Caliente, a distance of 36 miles. C. S. Henning, Dos Cabezas, Ariz., is chief engineer, and T. N. McCauley, Chicago, is president.

MCCONNELLSBURG & FORT LOUDON (Electric).—As soon as a charter is secured, this company will let a contract to build an electric line from McConnellsburg, Pa., east to Fort Loudon, about ten miles. E. J. Post, president, and S. Dandridge, chief engineer, McConnellsburg. (See *Pennsylvania Roads*, January 22, p. 1717.)

TEXAS ROADS.—Plans are being made to build a railway from Lubbock, Tex., west to Roswell, N. Mex., about 160 miles, it is said, and surveys will soon be started. Alpheus Judd and associates of Lubbock are back of the project.

WESTERN DOMINION.—Application is being made to the Canadian parliament for an extension of time in which to build the projected line from Calgary, Alta., south to Cut Bank, Mont., on the Great Northern, about 232 miles. O. E. Culbert, secretary, Calgary. (June 19, p. 1566.)

RAILWAY STRUCTURES

MILWAUKEE, WIS.—The Chicago & North Western will float the new bridge, which is to carry its main line across the Milwaukee river, into place on February 21. The Cleary-White Construction Company, Chicago, is the contractor. (See *Railway Age Gazette*, August 21, 1914, p. 370.)

ST. AUGUSTINE, FLA.—An officer of the Florida East Coast writes regarding the report that improvements to include new shops, a roundhouse, and yards are to be carried out at St. Augustine, that the entire proposition is being held up pending an easement in the money situation.

SHREVEPORT, LA.—The Vicksburg, Shreveport & Pacific has given a contract to the Blodgett Construction Company, Kansas City, it is said, to build a new bridge over the Red river, between Shreveport and Bossier City.

TRENTON, N. J.—The Pennsylvania Railroad is making plans for a new freight house, to be built at Trenton. The company also has under consideration the question of making other improvements.

Railway Financial News

ATLANTIC COAST LINE.—White, Weld & Company and the Guaranty Trust Company, both of New York, are offering \$1,100,000 first mortgage 4 per cent bonds of 1902-1952 of the Atlantic Coast Line at 92½, yielding 4.40 per cent on the investment.

BOSTON & MAINE.—The directors have asked the holders of the \$23,000,000 notes due March 2 either to extend them for six months at 6 per cent, or to accept as part payment notes of the Maine Railways Company to the extent of 35 per cent, and extend the remaining 65 per cent. The Maine Railways notes are 5 per cent 5-year notes with privilege of conversion into Maine Central stock for 4/7 of par value up to October 1, 1918, and the other 3/7 payable in cash.

ERIE.—This company has decided to change from the fiscal year ended June 30 to the calendar year for the period for which it will issue its annual report to stockholders.

MINNEAPOLIS & ST. LOUIS.—The Wall Street Journal says: "Local bankers say that negotiations have been started looking toward the acquisition of the Minneapolis & St. Louis by the Soo line" [Minneapolis, St. Paul & Sault Ste. Marie, a subsidiary of the Canadian Pacific]. The Wall Street Journal adds: "Newman Erb, president of the Minneapolis & St. Louis, is silent on the reports, but it is certain that he would not be adverse to selling the road if an equitable bargain could be struck."

NEW YORK, NEW HAVEN & HARTFORD.—The directors, in making a formal announcement of their future plans, reiterate the pledge already given to the Massachusetts legislature that the company will get rid of its steamship and trolley lines and other interests as soon as possible and will conserve all of its resources to the upbuilding of the steam railroad property.

WABASH.—The issue of \$1,545,000 receiver's certificates has been approved by Judge Adams. E. F. Kearney has been appointed co-receiver with E. B. Pryor.

RAILWAY CONSTRUCTION IN ECUADOR.—The topographical studies of the Huigra-Cuenca Railway are now completed for 15 miles, the preliminary localization to Lugmas Pass, 10 miles, and the definite localization, 2,488 ft. Grading was to have commenced January 1, with a force of 300 men, which number will be increased gradually to 1,000, as provided in the estimates.

OVERLAND TO PEKING.—The severance of international means of communication has made it necessary to devise new routes and connections. One of the routes where new arrangements have had to be made is that to and from the Far East. There is of course no rail connection between England and Petrograd via the German railways, and on the outbreak of war, in addition, Siberian traffic via Moscow and Petrograd became wholly disorganized as a result of military requirements, the journey from China to the Russian capital taking as much as a month. Things have now improved and a traveler has recently told how he managed to get from London to Peking via Siberia in 26 days, which is a record under existing conditions. He left King's Cross station in London at 5 p. m., on December 6, sailed from Newcastle at daybreak the following morning and reached Bergen at 5 p. m. on December 8, which enabled him to take the 6:40 p. m. train for Christiania, and thus to connect the following morning with the mail to Stockholm. Here there was a delay, but eventually the traveler arrived at Petrograd at 2 a. m. on December 15. After this, everything was plain sailing, for the weekly Siberian train left the same evening and the Chinese capital was reached on January 2. It seems probable that this schedule of 26 days will be improved before long. The Russian authorities are about to inaugurate various improvements in eastern travel, including a through express service between Petrograd and Vladivostok, and there is hope that the connection at Christiania could easily be so arranged as to obviate the necessity of spending a night and day at Stockholm.